# Evaluation of Transit-Related Transportation Control Measures

## *Final Report*

Prepared for the

The Regional Transportation Authority

by


**BARTON-ASCHMAN ASSOCIATES, INC.**

in Association with

Cambridge Systematics, Inc.
Beata Welsh

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# EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES

## EXECUTIVE SUMMARY

### Introduction

The Northeastern Illinois region has been designated as a severe nonattainment area for ozone. Mobile sources provide a significant portion of ozone precursor emissions in the region. Transportation control measures (TCMs) must be used in nonattainment areas to achieve reductions in vehicle miles traveled (VMT) and mobile source emissions. The Regional Transportation Authority (RTA), as the agency charged with providing comprehensive planning for the region's transit system, has taken a lead role in developing transit-related (TCMs) for the region's mobile source component of the State Implementation Plan (SIP).

To assist in the evaluation of TCMs, the RTA contracted with Barton-Aschman Associates, in association with Cambridge Systematics and Beata Welsh to develop an analytical "screening methodology" tool to provide an assessment of the effectiveness of selected transit-related TCMs in reducing VMT and mobile source emissions. The techniques developed to estimate the air quality impacts are designed to be transferable among TCM projects to allow the evaluation of similar types of transit projects. In addition, the analytical approach is designed to be "technically defensible" and includes the determination of key measures, such as changes in auto/transit mode split, changes in VMT, and the changes in emissions resulting from the implementation of transit TCM projects.

### Clean Air Act Amendments of 1990

The Clean Air Act Amendments of 1990 (CAAA) reaffirmed the nations commitment to air quality. The CAAA recognizes that the reduction in mobile source emissions resulting from improved technology has been offset by increases in the number of vehicle trips and in VMT. Northeastern Illinois has been designated as a severe nonattainment area for ozone, which means that the region has 15 years to reach attainment of the primary standard for ozone. By November 1996, the region must reduce hydrocarbon emissions by 15 percent, and then approximately three percent each year thereafter.

The SIP is the plan under which the state defines a series of specific, legally enforceable measures to reduce emissions. Reductions in pollutants from motor vehicles include those resulting from tighter restrictions on motor vehicle emissions, improvements in motor vehicle fuels, enhanced vehicle inspection and maintenance, employer commute options programs, and

TCMs. Section 108(f) of the CAAA lists 16 available TCMs that have the potential for encouraging trip diversion and reducing the overall demand for travel.

**Projects Selected for Evaluation**

The TCMs selected by the RTA for evaluation generally come under the heading of Improved Public Transit, but may also qualify as Traffic Flow Improvements, Areawide Rideshare Incentives, and Park-n-Ride/Fringe Parking. A Transit TCM Technical Committee was established to identify projects for analysis, coordinate data collection, and review the consultant's products. The committee was composed of the RTA, RTA Service Boards, (Chicago Transit Authority, Pace Suburban Bus Company, and Metra Commuter Rail), the Illinois Environmental Protection Agency, the Illinois Department of Transportation, and the Chicago Area Transportation Study (the region's metropolitan planning organization). Twelve candidate projects were selected for analysis, including park-n-ride lots, bus signal preemption, subscription bus, transportation centers, and the Transit Check Program.

**Overview of Methodologies**

The screening methodology process developed determines the air quality impacts of specific transit-related TCMs, based on two linked analytical procedures:

- A mode shift methodology that estimates changes in VMT by speed category.

- An emissions methodology that uses VMT by speed and MOBILE5 factors to estimate changes in volatile organic compounds (VOCs), carbon monoxide (CO), and nitrogen oxide (NOx) emissions.

Existing (1990) and future (2010) regional travel forecasts are used as the basis of the calculation process. Each TCM was analyzed for its potential impact on mode choice components, such as travel time or cost, and affected origin and destination zones. By estimating the effects of each TCM on the regional travel forecast in terms of change in auto share and transit share, changes in VMT by speed are generated. VMT by speed is a necessary input to the MOBILE5 emissions factor model. The A.M. peak hour was used as the basis for the analysis.

The mode share methodology is a logit mode choice model that is used in an "incremental" fashion that begins with existing mode shares and modifies these baseline values on the basis of changes in the characteristics of the transit network. The principal advantage of this technique is that it requires descriptions of only those aspects of the system that are anticipated to change.

The emissions methodology provides a means for analyzing the impacts of alternative TCM

strategies on mobile source emissions. It is designed to provide an easy-to-use means of analysis, using available travel data and emission factors generated through the U.S. Environmental Protection Agency's (EPA) MOBILE5 emission factor model. The emission spreadsheet applies emission factors by speed to a given volume of traffic to calculate total tons of VOC, CO, and NOx for a given project.

**Evaluation Results**

Results for each TCM were generated using the mode shift and emissions methodologies. The following results were calculated for each TCM:

- Area of Impact (origin and destination zones)
- Travel Markets Impacted
- Travel Time and Cost Impacts
- Number of Impacted Zones
- Changes in Peak VMT (by CBD work, nonCBD work, and nonwork trips)
- Changes in Daily Emissions
- Trip Table Summary for A.M. Peak Hour
- Potential Secondary Impacts

**Conclusions**

Each TCM was evaluated on the basis of its relative effectiveness in reducing VMT and emissions using information currently available from the sponsoring agency and from CATS. Those projects with the most impact on travel time and/or travel cost have greater effects on mode share, reduced auto trips, and emissions.

In addition to identifying those projects with the least and greatest impacts, it is also important to distinguish between those projects that reduce VMT and those that eliminate trips altogether. Projects including park-n-ride lots, such as rapid transit/commuter rail stations, vanpool services, or subscription bus services may reduce VMT, but still generate auto trips to and from park-n-ride or pickup/drop-off locations. These projects will still generate significant emissions by vehicles driven in the cold start mode.

The methodology was developed for this project as a screening tool to be used at the regional level. In addition, the methodology employed was designed to estimate results consistent with regional travel models, but without rerunning the regional models. Based on these, there are inherent limitations in the process. Some of these limitations may be overcome by rerunning the regional models, conducting sensitivity analysis, or supplementing survey data for the regional travel data. It is important to identify and take into consideration these limitations when results are interpreted and conclusions made about the impact of specific TCMs.

# 1.
# Introduction

The Northeastern Illinois region has been designated as a severe nonattainment area for ozone. Mobile sources provide a significant portion of ozone precursor emissions in the region. Section 108 of the Clean Air Act Amendments of 1990 lists 16 Transportation Control Measures (TCMs) that nonattainment areas may use to achieve reductions in vehicle miles traveled (VMT) and mobile source emissions. The U.S. Environmental Protection Agency (U.S. EPA) has also identified a typology of "improved public transit" measures within its TCM information document, "Transportation Control Measures: State Implementation Plan Guidance," issued September 1990.

The VMT and emissions reduction potential of transit-related TCMs must be evaluated for development of the State Implementation Plan (SIP), for conformity analysis of the region's Transportation Improvement Program (TIP), and for funding of transit projects through the Congestion Mitigation and Air Quality Improvement Program under the Intermodal Surface Transportation Efficiency Act (ISTEA).

To assist in the evaluation of TCMs, the Regional Transportation Authority requested the development of a screening methodology tool. The purpose of this screening tool is to provide an assessment of the effectiveness of selected transit-related TCMs in reducing VMT and mobile source emissions. To be effective, this screening tool is designed to use estimation techniques that are transferable among projects. The tool also is designed to provide the supporting technical documentation needed for inclusion in the SIP of transit-related TCMs.

The screening methodology described in this report determines the air quality impacts of specific transit projects that are currently planned or programmed. The techniques developed to estimate these air quality impacts are designed to be transferred among TCM projects to allow the evaluation of similar types of transit projects. In addition, the analytical approach is "technically

defensible" and includes the determination of key measures, such as changes in auto/transit mode split, changes in vehicle miles traveled (VMT), and the changes in emissions resulting from the implementation of the transit TCM projects.

This summary report of findings, in conjunction with the two companion documents, comprises the full documentation for this evaluation tool development process. The two documents are as follows:

- *Task 1.1 Technical Memorandum—Project Identification.* Contains a description of the data available for each TCM, summaries of interviews with project sponsors, and identification of project issues.

- *User Guide.* Contains step-by-step instructions for applying the evaluation tool to future projects.

# 2.
# The Clean Air Act and Amendments through 1990

The federal Clean Air Act, originally enacted in 1963, is the nation's central air pollution control legislation. In the Clean Air Act Amendments of 1970, the federal government assumed major responsibility for air quality standards and the deadlines for meeting the standards.

The 1970 amendments included the following provisions:

- The establishment of National Ambient Air Quality Standards (NAAQS) for six pollutants: carbon monoxide (CO), hydrocarbons (HO), nitrogen dioxide, photochemical oxidants, sulfur oxides, and total suspended particulates.

- The establishment of a motor vehicle emissions control program.

- The initiation of requirements for State Implementation Plans (SIP) that detail how areas that exceed standards (nonattainment areas) plan to attain and maintain those standards.

By 1977, significant progress had been made toward improving air quality, but problems with carbon monoxide and ozone levels persisted. Additional amendments to the Act placed special emphasis on mobile source emissions and Transportation Control Measures (TCMs) that would help decrease these emissions and their related pollutants.

The U.S. Environmental Protection Agency (U.S. EPA) was given authority to impose sanctions where SIP programs were not being planned or effectively implemented. Air quality planning was to be coordinated with transportation planning. Metropolitan Planning Organizations (MPOs) were prohibited from approving any transit project, program, or plan in the Transportation Improvement Program (TIP) that did not conform to the SIP.

The Clean Air Act Amendments (CAAA) of 1990 reaffirmed the nation's commitment to air quality. CAAA addressed air toxins, acid rain, and stratospheric ozone as well as mobile sources. It recognized that the reduction in mobile source emissions resulting from improved technology has been offset by the impact of increases in number of vehicle trips and in vehicle miles traveled (VMT). Timetables were established for attaining the NAAQS, which specify the concentration of pollutants in the outdoor air that are considered safe.

Nearly every major metropolitan area in the United States fails to meet at least one of these standards. The Northeastern Illinois region is in attainment for carbon monoxide (CO), but has been classified by the U.S. EPA as a severe non-attainment area for ozone. The severe non-attainment classification means that the region has 15 years to reach attainment of the primary standard for ozone. This translates to a 50 percent reduction in hydrocarbon emissions, the precursors to ozone formation. A new requirement stipulates that six years after November 1990, the region will need to reduce hydrocarbon emissions by 15 percent, and then approximately 3 percent each year thereafter.

## 2.1 Transportation Control Measures (TCMs)

The U.S. EPA's *Transportation Control Measures Information Documents*, issued March 1992, provide basic information on the interrelationship between transportation and air quality and the manner in which TCM's can affect emissions and vehicle miles traveled (VMT).

The regional SIP is the plan under which the state defines a series of specific, legally enforceable measures to reduce pollutant emissions from motor vehicles and local industry. Reductions in pollutants from motor vehicles include those resulting from tighter restrictions on motor vehicle emissions, improvements in motor vehicle fuels, enhanced vehicle inspection and maintenance, employer trip reduction plans, and transportation control measures.

TCMs are transportation strategies that are intended to both reduce vehicle miles of travel and to make the miles that are traveled more efficient. The goal of the TCMs is to reduce auto dependency by diverting trips to other modes or by reducing demand for travel by adding to the cost of automobile usage.

The term TCM generally includes projects that affect both system management and the demand for transportation. Many TCM projects may overlap into both areas.

Transportation System Management (TSM) usually refers to low capital-intensive projects, such as carpool and vanpool programs, parking management, traffic flow improvements, and park-n-ride lots.

Transportation Demand Management (TDM) is considered to be the policies, programs, and actions that encourage the use of high-occupancy vehicles (HOV) (transit, subscription services, carpools and vanpools); bicycling; walking to work; and the use of alternative work programs (flextime, compressed time, flexplace).

The implementation of successful TCMs requires the initiation of a cooperative process involving the commitment of air quality and transportation planning and operating agencies. With the requirements for Employee Commute Options (ECO) programs, employers will also play a critical role in the process.

TCMs reduce emissions through a change in the amount of travel generated or through a change in the lengths of trips. Peter Stopher, in his paper, "Deficiencies in Travel Forecasting Procedures Relevant to the 1990 Clean Air Act Amendment Requirements" (December 1991), has constructed a table that presents the TCM impacts on travel behavior categories. It is shown here as Table 1.

Table 1
CORRESPONDENCE BETWEEN TRAVEL BEHAVIOR IMPACTS AND TCMs

| Transportation Control Measures | Impact | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | In-vehicle Time | Walk Time | Wait Time | Cost | Time of Day | Convenience | Walk All the Way | Bicycle | Number of Trips Made | New Destination |
| Transit Improvements | ✓ | ✓ | ✓ | | ✓ | | | | | ✓ |
| HOV lanes | ✓ | | | | | ✓ | | | | |
| Employer TRP's | | ✓ | | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| Trip-Red. Ord. | | | | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| Traffic Flow | ✓ | | | | | | | | | ✓ |
| Park-and-Ride | ✓ | | ✓ | ✓ | ✓ | | | | | |
| Restricted Areas | | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Ride Matching | ✓ | | | | | | | | | |
| Bike/ped. paths | ✓ | | | | | | ✓ | ✓ | | ✓ |
| Bike Lanes/ Storage | ✓ | | | | | | | ✓ | | ✓ |
| Flex Time | ✓ | ✓ | ✓ | | ✓ | | | | ✓ | |
| Non-Auto Travel | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | | ✓ |
| ROW Conversion | ✓ | | | | | | ✓ | ✓ | | ✓ |

*Source:* "Deficiencies in Travel Forecasting Procedures Relevant to the 1990 Clean Air Act Amendment Requirements," Peter Stopher, December 1991.

Section 108(f) of the Clean Air Act Amendments of 1990 lists 16 available TCMs that have the potential for encouraging trip diversion and for reducing the overall demand for travel. They are as follows:

- Trip Reduction Ordinances
- Employer-Based Transportation Management Programs
- Work Schedule Changes
- Areawide Rideshare Incentives
- Improved Public Transit
- High Occupancy Vehicle Lanes
- Traffic Flow Improvements
- Parking Management
- Park-n-Ride/Fringe Parking
- Bicycle and Pedestrian Programs
- Special Events
- Vehicle Use Limitations/Restrictions
- Activity Centers
- Accelerated Retirement of Vehicles
- Extended Vehicle Idling
- Extreme Low-Temperature Cold Starts

TCM programs work best when they are implemented as a system of changes. Some TCMs are mutually supportive in that, when implemented together, they can increase the effectiveness of an individual TCM. Trip Reduction Ordinances can be enhanced when alternatives to single-occupant vehicle travel such as Improved Public Transit, Bicycle and Pedestrian Programs and Areawide Ridesharing are also implemented. Park-n-Ride/Fringe Parking improvements can support the provision of Improved Public Transit and High Occupancy Vehicle (HOV) Lanes.

The areawide implementation of a system can also work to avoid potential conflict in TCMs. The conflicts between Areawide Rideshare Incentives and Improved Public Transit can be eliminated when planned for in a unified manner.

# 3.
# Projects Selected for Evaluation

The Transportation Control Measures (TCMs) selected by the RTA for evaluation generally come under the heading of Improved Public Transit. There are some that may also qualify as projects under Traffic Flow Improvements, Areawide Rideshare Incentives, and Park-n-Ride/ Fringe Parking. Other selected TCMs will increase the effectiveness of a strategy. The regional Employer Trip Reduction Program could be made more effective if employers were encouraged to participate in the regional Transit Check program at the same time. This overlap of categories can have additive benefits for other projects.

In general, Improved Public Transit is defined by the U.S. EPA as the implementation of new and expanded public transit services relevant to all transit modes, such as paratransit, buses, rapid transit, and commuter rail. The strategies that are developed in this TCM fall into three areas: System/Service Expansion, System/Service Operational Improvements, and Demand Market Strategies.

A series of 12 TCM candidate projects were selected by the RTA and its Service Boards (CTA, Pace, Metra) for consideration in this analysis. Further detail on each of the TCMs is provided in Appendix A, Profiles of Transportation Control Measures. A comparative matrix of the TCMs is shown in Table 2. The projects selected for analysis and the areas into which they fall are as follows:

1. Transit station park-n-ride lots, Metra—West Chicago rail station, Chicago & North Western—West line; system/service operational improvements. Additional park-n-ride lot is added at this station.

2. Transit station park-n-ride lots, CTA—Cumberland station, O'Hare rail line; system/service operational improvements. Increased capacity at parking facility by 750 spaces to 1,500

# TRANSPORTATION CONTROL MEASURES

**Table 2** SUMMARY MATRIX

| TCM Type | Physical Description | Location | Service Change (change in bus or rail service) | TCM Capacity | Ridership | | Connecting roadway impacts | Potential Benefits | Potential Deficits | Cost | Relationship to ETR plans |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Current | Expected change | | | | | |
| 1. Transit station Park & Ride lots | parking lot at rail station | Metra rail station | | same | | | | Reallocate rail riders from buses, other rail stations or other rail lines. More balanced loading. | Cold Start issue | | Only if employer is supporting parking and/or rail fare |
| 2. Transit station Park & Ride lots | Increased parking capacity at facility with 760 spaces to 1600. Facility has reserved first floor for HOV (350 spaces) and Disabled (25 spaces). Facility directly connected to rail line, bus terminal, and kiss and ride. | CTA-Cumberland, O'Hare line. Opened May 92 | Not direct service change. GFI fare box data can be reviewed for CTA service. Changes in rail and bus ridership not analyzed to date. | 760 new spaces on two new decks. | '91 rail traf- 1.48 mil. Bus wkd 2.7k | needs to be meas ured | Cumberland ATD may be 40 k. New capacity may edd 2 k. or one lane of traffic. Need to verify. | Increased use of O'Hare Line. Decreased use of Expressway | Cold Start issue and increased local roadways. Decreased use of feeder buses | | Only if employer is supporting parking and/or rail fare |
| 3. Transit station re-design | Station platform extension, bus bridge extension and vertical access facilities. | CTA-95th Street Station, Dan Ryan Line | Separation of boarding and alighting. Allow more reliable service because of ability to schedule recovery time. | same | '91 rail traf- 6 mil 20k/ day | needs to be meas ured | none | Facilitate bus movement; Shorten trip time; increase attractiveness | Need to assure buses do not idle during recovery | $24.9 mil (1986 dollars) | Only if employer is supporting parking and/or rail fare |
| 4. Transportation center/Transfer facility | Facility with 10 berths for buses, 200 park n ride spaces, and accom for dial a ride, vanpools and express bus | Pace-Martingale and Kimberly, Schaumburg | Bus staging. Bring many services together. Pulse boardings. Provide service to Sears and NW suburbs. May replace Woodfield as terminal (service will still go through). | same | | 4.8k | local streets - high. Minimal on arterials. | Faster, safer, more comfortable, more reliable transfers, reduction in VMT | Cold start issue for park n ride. Need to assure buses do not idle during recovery. Increased usage of local roads | $3M | Direct through van pools and dial a ride |
| 5. Feeder bus route design/Schedule Coordination | New bus route at rail station to accom. commuters walking to offices | Metra rail station Wood Dale, MIL-West line | No current bus service. Rail service changed in Sept. | same | none | need 48+ | AM gridlock, need data | Mode shifting from auto. Reduction of auto trips | None as provided by Metra | $12,500 for 1 bus for 3 months | Direct if shift from auto. Employers could help with funding. |

## Table 2(cont'd)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.Bus Signal Preemption | Buses may pre-empt signal changes except when ahead of schedule | Pace and CTA-Cermak-54th to IL43, Route No 304, 322 - Pace; No. 25 - CTA | May result in faster and more reliable service. | same | CTA 930, Pace 510 1 | CTA +2% Pace +5% | only a 3 second change. Negligible impact | Faster roadway movement. Mode shifting | Minimal impacts on connecting | IDOT 7, Pace & Vapor $45,000 | indirect - only if a mode shift |
| 7.Restricted use lanes/facilities for transit vehicles | Toll plaza reconstruction buses allowed to use automatic lanes | Pace-I294/83rd St. Toll Plaza. Route No. 666,677 | May allow increase in bus service | same | 1.1k | + | Plaza heavily used, long delays | Faster roadway movement. Mode shifting | Increases in expressway usage, | $40 @ month + tolls | indirect - only if a mode shift |
| 8.Automatic Vehicle Location/Control, includes signal preemption | Permits management of bus schedule adherence. 45 buses 5 intersection | CTA-# 3 King Drive bus route | May result in reduction of bus bunching, faster service and number of buses needed on route | same | 16k total /64 per bus | +3% /66 per bus | only a 3 second change. Negligible impact | Faster roadway movement. Mode shifting | Minimal impacts on connecting | $850k allocation of $40m to 45 buses and 5 intersections | indirect - only if a mode shift |
| 9.Subscription bus service | Buses from standard locations to one site in suburbs | Pace-Service from SW side of Chgo to new Sears headquarters in Hoffman Estates | New service of 13 routes. Pick up in parking lots of Sears stores | up to 13 buses | none | Aver 30 per bus 390 | all new roadways | Development of a park or walk n ride area | Increased traffic around stores, mode shift from current transit | Need specific. | Direct, Sears required to comply with ETR |
| 10.Vanpools | Vans operated from common (or multiple) pick up point to one site in suburbs | Pace sponsored drivers keep vans and drive others to Sears headquarters in Hoffman Estates | New service of 13 vans with a goal of 42. Sized from minivans (8) to conversion vans (15). Goal to divert auto drivers to transit. | up to 42 vans | 110 | Aver 6.5 per bus, 350 to 400 | nine cars out of 10 driven by individual. Suburban veh occp 1.16 | diversion from auto may be 60% | Increased traffic around central pick up point, cold start issue | $2.2 M revenue = 60% cost recovery. 7-30¢ subsidy | Direct, Sears required to comply with ETR |
| 11.Transit fare subsidy/ marketing | Transit check, employer buys for up to $21.00 and gives to employee. | RTA sponsored and administered. Available to all regional employers. | Tax free to employee and a tax deductible business expense to employer. RTA survey said 15% might use. | N/A | 275 co. 6.5k | + unlim | if 15% of users new to transit would lower usage | mode shifting, reduce auto trips and VMT | Induced travel. Employers need to understand tax effects | Funding neutral except admin costs | Direct if employer picks up costs |
| 12.Capacity/ speed improvements for transit service | Grade separation of roadway and rail line | Metra-Franklin Park rail station, Rose/25th Ave. MIL-W | Train stop at station blocks road and pedestrian access. Separation will imp. movement. | same | 490 bds | + ? | usage 12,900. Expected change unknown | Increased access to parking lots, improved traffic movement | Increased roadway usage | $6M | Indirect, if employer pays rail costs |

spaces. Facility has reserved first floor: 350 spaces for HOV (carpools) and 25 spaces for the disabled. CATS has supplied staff to enforce HOV parking. The facility is directly connected to rapid transit rail line, bus terminal, and kiss-n-ride area.

3. Transit station redesign, CTA—95th Street station, Dan Ryan rail line; system/service operational improvements, improved transfer. Expansion and enlargement of existing station and alteration of usage patterns to facilitate flow through the station. The length of the train platform would be nearly doubled by adding approximately 400 feet. The bus bridge will be extended by 400 feet to allow for separation of boarding and alighting from buses. Conflicts between intercity and city buses will be eliminated. The station will be made accessible to people with disabilities.

4. Transportation center/transfer facility, Pace—Schaumburg, system/service operational improvements, improved transfer and demand/market strategies, passenger amenities. A facility designed to open with 10 bus berths, which includes some excess capacity. Some berths are for the limited and express bus routes, and others are for two dial-a-ride services. Vanpools will use the facility as a pickup point utilizing the kiss-n-ride area. A 200-space park-n-ride lot is also provided.

5. Distributor bus route, Metra—Wood Dale rail station, Milwaukee—West line; system/service operational improvements and service expansion. Initiation of distributor bus service from the rail station to the surrounding commercial and industrial businesses.

6. Bus signal preemption, Pace and CTA—Cermak Road; system/service operational improvements. Pace buses will be able to preempt signal changes at 15 signalized intersections in a 1.5-mile corridor on Cermak Road from 54th Avenue (Douglas L) to North Riverside Mall. To be used when behind schedule and not in conflict with emergency vehicles.

7. Restricted use lanes/facilities for transit vehicles, Pace—Interstate 294/83rd Street Toll Plaza; system/service operational improvements, road operational changes. Pace bus routes #888 and #877 will be able to go through the automated toll lane without stopping by using automatic vehicle identification (AVI).

8. Bus service management system (BSMS), CTA—King Drive; system/service operational improvements, operations monitoring and bus traffic signal preemption. Automatic vehicle location/control and bus signal preemption systems that permit management of bus schedule adherence, bus location, and assurance of employee and rider security. Buses may preempt signal changes except when ahead of schedule. In the initial stage BSMS includes five signalized intersections on a one-mile section of King Drive and 162 buses (including 45 for King Drive). Upon acceptance, the RFP calls for the rest of CTA's buses and 195 additional intersections throughout the system to be equipped.

9. Subscription bus service, Pace—Hoffman Estates; service expansion and system/service operational improvements. Pace service will be provided from southwest side of Chicago to new Sears Headquarters in Hoffman Estates.

Pace will offer this specialized service to address the specific needs of suburban employees. The service provides direct transportation between a residential collection area and a place of employment for groups of 30 or more individuals. It operates according to a prescribed schedule and travels along a designated route, with passengers offered a guaranteed seat in return for reserving transportation on a monthly basis. Service is "open door" in that it is not restricted to employees of specific firms.

Vehicles and drivers are provided by a private carrier. The vehicle is normally an "over the road" bus.

Sears is assisting in the development of up to 13 routes. Service will be phasing in as people are transferred from the Sears Tower to Hoffman Estates. Sears store parking lots to be used as pickup points.

10. Vanpools, Pace—Hoffman Estates and regionwide; service expansion. Pace subscription vanpool service with concentration on the Sears service from a variety of Chicago and suburban locations to new Sears Headquarters in Hoffman Estates. Sears is assisting in the development of up to 42 vanpools. Two different types of pickups. One is the collection of individuals along the route at a single common pickup point. The second is the collection of individuals at multiple of common pickup points.

    As a new service initiative, Pace is integrating vanpool operations into its service mix. These operations address the transit needs of area employees on a smaller scale than subscription bus service. Vanpools generally consist of 6 to 15 persons commuting to a common employment site.

11. Transit fare subsidy/marketing, regionwide RTA Transit Check Program; demand/market strategies, employer offered incentives. RTA-sponsored and -administered Transit Check Program. Available to any regional employer that sends form and check to RTA. Checks can be issued in various denominations up to $60.00. Transit Check can be used like cash anywhere that tokens or passes are sold.

    The checks can be ordered three months in advance and are good for 120 days after date of issue. The checks are tax-free to employees and are a tax-deductible business expense to employers.

12. Capacity/speed improvements, Metra—Franklin Park rail station, Rose Street/25th Avenue, Milwaukee West Line; system/service operational improvements, road operational changes and improved transfers; grade separation, at railroad crossing, of roadway (FAU 2714) and Metra commuter rail line (Milwaukee West Line). Substantial freight movements slow traffic. Commuter trains block the roadway when stopping for the station and also block pedestrians from crossing the tracks when walking from the parking lots to the station. Two of the three parking lots are opposite the inbound platform.

# 4.
# Overview of Methodologies

The overall objective for analyzing each transit TCM selected by the RTA is to develop a methodology that would evaluate and compare the impact of each TCM on travel behavior and pollutant emissions. This methodology must also:

1. Be "technically defensible" relative to U.S. EPA and IEPA reviews.

2. Provide a consistent evaluation of transit-related TCMs.

3. Be based on existing regional travel data to provide realistic results.

## 4.1 Evaluation Process

The screening methodology process, as described below, determines the air quality impacts of specific transit TCMs. This process, as shown in Figure 1, is based on two specific methodologies:

- A travel demand impact methodology that estimates changes in vehicle miles traveled (VMT) by speed categories.

- An emissions methodology that uses VMT by speed and MOBILE5 factors to estimate changes in volatile organic compounds (VOCs), carbon monoxide (CO), and nitrogen oxide ($NO_x$) emissions.

Existing (1990) and future (2010) regional travel models are used as the base of the calculation process. Each TCM was analyzed for its potential impact on mode choice components, such as travel time or cost, and affected origin and destination zones. The origin/destination zones

# TCM EVALUATION MODEL

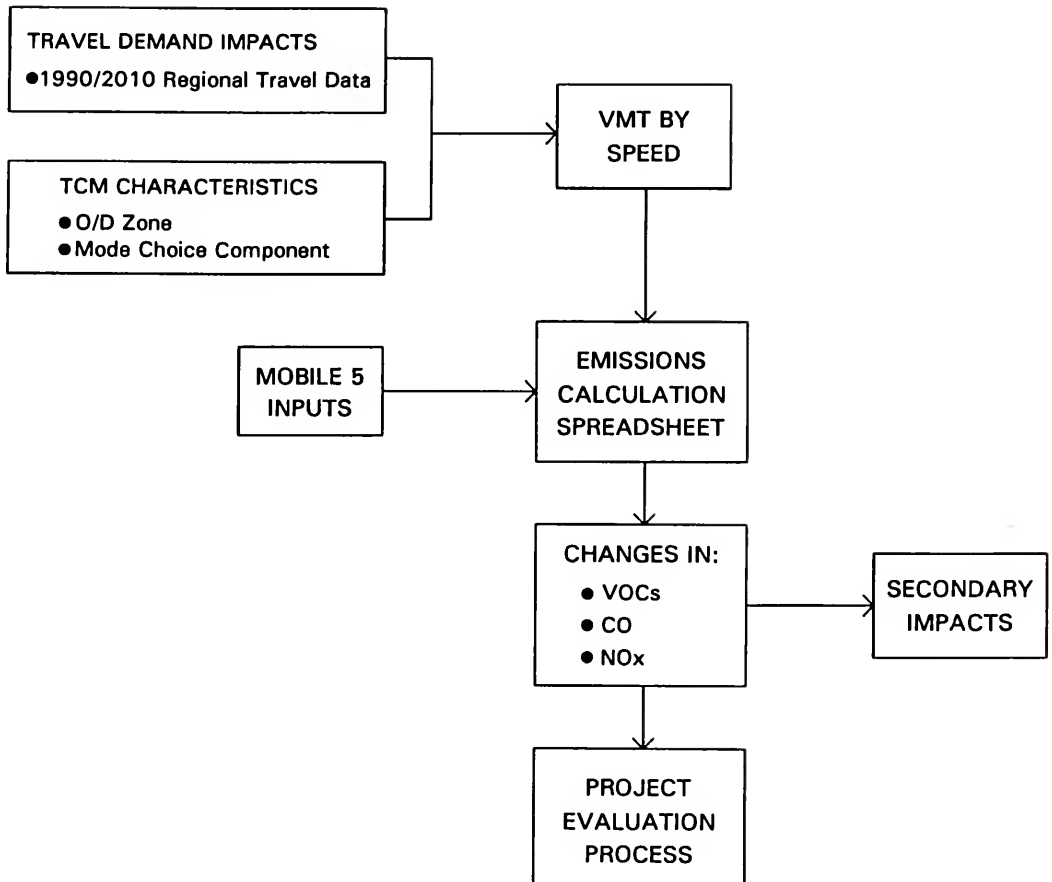


Figure 1

were based on regional travel analysis zones, since the regional travel models are based on those zones. In some cases, the origin and destination zones were different, such as origin zones around a park-n-ride lot and destination zones in the downtown. Other TCMs had origin and destination zones that were the same, such as a line-haul transit route.

By estimating the effects of each TCM on the regional travel model, changes in VMT by speed are generated. VMT by speed is a necessary input to the MOBILE5 emissions factor model. MOBILE5 then calculates changes in VOC, CO, and $NO_x$.

This process was designed to estimate results consistent with the regional database without rerunning the regional travel models. For this process to produce results, transit trips must currently exist in the regional model. To analyze TCMs in areas where there are no existing transit trips, such as the new vanpool or subscription bus service to Sears in Hoffman Estates, these must be calculated manually, or the regional models must be rerun.

The travel demand impact methodology and the emissions calculation methodologies are described below. More detailed information on the mechanics of each methodology can be found in the *User's Guide.*

## 4.2 Travel Demand Impact Methodology

The purpose of this methodology is to estimate the effect of selected TCMs on VMT and speed. Regional travel data for 1990 and 2010 were provided by the Chicago Area Transportation Study (CATS).

The methodology selected is a logit mode choice model that is used in an "incremental" fashion that begins with existing mode shares and modifies these baseline values based on changes in the characteristics of the transit network.[1] The principal advantage of this technique is that it requires descriptions of only those aspects of the system that are anticipated to change.

The incremental form of the logit model is a simple derivation of the standard multinomial logit formulation. Both forms of the logit model yield identical estimates of a traveler's responses to changes in the highway and transit systems, assuming that the standard form has been sufficiently validated against existing conditions.

The standard logit formulation is:

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[1] This methodology is adapted from the methodology used in the Honolulu Rapid Transit Program, as outlined in the report, *Task 3.03—Service and Patronage Forecasting Methodology*, prepared for the Department of Transportation Services, Office of Rapid Transit, City and County of Honolulu, by Barton-Aschman Associates, Inc., and Parsons Brinckerhoff Quade & Douglas, Inc., March 1992.

$$P_i = \frac{\exp(U_i)}{\Sigma_m[\exp(U_m)]}$$

where: $P_i$ = the probability of using mode i
$U_i$ = the utility of mode i
$\Sigma_m$ = the summation over all available modes
exp = the natural logarithm

The incremental form of the logit formulation is:

$$P'_i = \frac{P_i \times \exp(\Delta U_i)}{\Sigma_m[P_m \times \exp(\Delta U_m)]}$$

where: $P'_i$ = the revised probability of using mode i
$\Delta U_i$ = the change in utility of mode i

Because the incremental form is an exact derivative of the standard form, it preserves the variable elasticities present in the standard logit model. The direct elasticity for either formulation for $P_i$ with respect to a change in an attribute of alternative i is:

$$E(i,x_i) = B_{xi}X_i(1 - P_i)$$

where: $B_{xi}$ = the coefficient of $x_i$ in the utility expression for alternative i
$X_i$ = the value of $x_i$ at the point for which elasticity is evaluated

It can be seen clearly from this expression that the elasticity varies across travel markets. In markets with high existing transit shares, the elasticity tends to be lower than in markets with lower existing shares. Similarly, where $x_i$ is large, elasticities tend to be larger. Because both $P_i$ and $x_i$ can vary substantially from one market to another, the incremental logit approach is able to capture the wide variations in elasticities that are ignored in the application of constant elasticities to all travel markets.

In forecasts of aggregate travel patterns, the probability $P_i$ applied to person-trips from each zone-to-zone interchange becomes the *share* of all trips attracted to mode i. In order to estimate the revised transit share of all trips, it is necessary to know only the base share $P_i$ held by transit and the change in utility for each of the modes m that are available, including transit. The estimate of utility for each mode includes its time and costs, often with some descriptor of the traveler.

The utility expression is written as:

$$U_i = C_i + B_1x_i + B_2y_i \ldots .$$

where: $C_i$ = the mode-specific constant for mode i
$x_i, y_i$ = attributes of mode i, typically times and costs
$B_1, B_2$ = coefficients describing the relative importance of x and y in determining the utility of i

In a model where x and y are the only variables, then the change or difference in utility $\Delta U_i$ can be expressed as:

$$\Delta U_i = (C_i + B_1 x_i' + B_2 y_i') - (C_i + B_1 x_i + B_2 y_i)$$

$$= B_1(x_i' - x_i) + B_2(y_i' - y_i)$$

where ' indicates the value in the forecast year. Thus, the mode-specific constants fall out of the computations. Indeed, the only terms entering the equation are those for which a change occurs.

### 4.2.1 CATS Model Form

The CATS regional binary mode choice model is the basis for this analysis. The estimated coefficients for the binary mode choice model are shown in Table 3.

The *in-vehicle time* is the time spent in the transit vehicle. If several transit vehicles are ridden, then the combined time spent in each of these is the in-vehicle time. The *out-of-vehicle time* (or transfer time) is the time spent transferring between transit vehicles. This time includes walk egress from transit, but does *not* include walk access time. There is no time provided for walk access, since the data is not available. CATS uses walk access within the mode split portion of its modeling process. During that process, walk access is combined with several other factors and is never computed separately. *First wait time* is the time spent waiting for the first transit vehicle. If transfers are made

Table 3
REGIONAL BINARY MODE CHOICE COEFFICIENTS

| | Work | | Non-Work | |
|---|---|---|---|---|
| | **Non-CBD** | **CBD** | **Non-CBD** | **CBD** |
| In vehicle time (minutes) | 0.0186 | 0.0159 | 0.0114 | 0.0114 |
| Transfer time (minutes) | 0.0399 | 0.0290 | 0.0589 | 0.0589 |
| Cost (1970 ¢) | 0.0072 | 0.0085 | 0.0329 | 0.0329 |
| Walk time (minutes) | 0.0584 | 0.0468 | 0.0663 | 0.0663 |
| First wait time (minutes) | 0.0811 | 0.0173 | 0.0610 | 0.0610 |
| Bias | -0.4983 | -0.6059 | -0.2726 | -0.2726 |

*Source: Chicago Circulator AA/DEIS Model Methodology Report*, Appendix A, Barton-Aschman Associates, Inc., December 1990.

to other vehicles along the trip path, the wait associated with these other vehicles is *not* included. Instead, the additional wait time for other vehicles is included in the out-of-vehicle (or transfer) time. Fare is the cost incurred by using transit. All times are in minutes and all fares are in cents.

The bias coefficients will not be used in any part of the analysis. Note that the coefficients listed are utilities. In the logit model, the disutilities, or negatives of the listed values, will be used.

### 4.2.2 Required Regional Model Input

The inputs required from CATS for this process are the following regional matrices:

- Person-trips made in autos (by purpose).
- Transit person-trips (by purpose).
- Auto travel time skims.
- Auto travel distance skims.
- Transit in-vehicle travel time.
- Transit transfer travel time.
- Transit walk time.
- Transit first wait time.
- Transit cost.

### 4.2.3 Travel Time Period

The A.M. peak hour was determined to be the most appropriate basis for this analysis for the following reasons:

- Most transit TCMs are directed at work-related commuter travel.
- The A.M. peak hour has the largest proportion of work-related commuter travel to total volume of traffic.
- The A.M. peak hour has the closest relationship to the data base from which the elasticity factors are drawn (home-based work trip) and is thus most representative of those conditions.

The trip tables available from CATS are daily person-trip tables, so peak-hour factors were applied. Table 4 shows peak-hour factors for auto driver/passenger and transit person-trips. These factors were calculated from the CATS 1970 home interview survey. The A.M. peak hour includes all trips beginning between the hours of 7:00 and 8:00 A.M. The P.M. peak-hour trips start between 4:00 and 5:00 P.M.

Table 4
A.M./P.M. PEAK-HOUR FACTORS BY MODE AND TRIP PURPOSE

| Mode and Trip Purpose | Percent of Trips in A.M. Peak Hour | Percent of Trips in P.M. Peak Hour |
|---|---|---|
| **Auto Driver/Passenger** | | |
| Home-to-Work | 30.5% | 1.6% |
| Work-to-Home | 1.0 | 27.9 |
| Home-to-Nonwork | 3.6 | 4.8 |
| Nonwork-to-Home | 1.6 | 6.4 |
| Nonhome-to-Nonhome | 0.8 | 6.9 |
| **Transit** | | |
| Home-to-Work | 40.1 | 1.1 |
| Work-to-Home | 0.6 | 37.1 |
| Home-to-Nonwork | 17.0 | 2.9 |
| Nonwork-to-Home | 0.0 | 10.6 |
| Nonhome-to-Nonhome | 2.0 | 15.3 |

The transit person-trip table separated trips into the three trip purposes: home-to-work, home-to-nonwork, and other. The corresponding A.M. peak-hour factors were applied.

To convert auto person-trips to vehicle trips, the auto person-trip table was divided by a vehicle occupancy factor. This was done only for the auto trip tables and only when calculating VMT. The vehicle occupancy factor used for work trips (based on 1990 Census Data) was 1.09 and the factor used for nonwork trips (based on the 1970 Home Interview Study) was 1.345.

### 4.2.4 Application Process

The following general process was followed to analyze the effects of the transit TCMs:

1. Identify the travel analysis zones impacted by the change. Specific origin and destination zones are to be identified.

2. Identify the change in transit service characteristics (e.g., travel time, travel cost).

3. Calculate the base mode shares (auto and transit) from the CATS trip tables.

4. Calculate the alternative shares on an interchange-by-interchange basis using the incremental logit formulation.

5. Calculate the revised VMT by speed for the interchange based on Items 3 and 4 above.

The auto speed for each interchange is calculated by dividing the auto distance in miles by the auto travel time to yield speed in miles per hour.

In addition to the above five steps, the base (no TCM project) VMT was calculated for each to allow the change in VMT to be calculated following Step 5 above. The following process was applied to each TCM.

- Step One. The area for which each TCM is anticipated to have an impact was identified by origin and destination zones using the CATS travel analysis zone map as the base. CATS zones were used to define the boundaries, as CATS regional travel model data was used. These zones typically range from one-half to one square mile.

- Step Two. After identifying the impacted origin and destination travel analysis zones, the mode choice model component or components that would be affected were determined and the change was estimated.

  The mode choice model components that were affected by the TCM projects include:
  - In-vehicle time (minutes)
  - Transfer time (minutes)
  - Cost (1970¢)
  - Walk time (minutes)
  - First wait time (minutes)

- Steps Three through Five. Each of these steps involved matrix calculations to apply the incremental logit formulas and were accomplished using the EMME/2 transportation planning model. The procedures involved are described in more detail in the *User's Guide.*

The output of this process was a lotus spreadsheet summarizing base and new VMT for 1990 and 2010 by speed. This spreadsheet was then used as an input to the emissions calculation spreadsheet.

### 4.3 Emissions Calculation Methodology

The Total Emissions Spreadsheet provides a means of analyzing the impacts of alternative transportation control measure (TCM) strategies on mobile source (transportation-related) air

pollutant emissions. It is designed to provide an easy-to-use means of analysis, using available travel data and emission factors generated through EPA's MOBILE emission factor model. The spreadsheet uses an emission factor look-up table to apply emission factors by speed to a given volume of traffic (defined in terms of vehicle miles of travel or VMT) to calculate total tons of mobile source VOC, CO, and NOx emissions for a given scenario. The design of the spreadsheet allows for two scenarios, a base condition and a new condition, to be run concurrently and compared in terms of total emission impacts.

In order to apply the spreadsheet, alternative scenarios should be defined for a specified analysis area for which there is available travel data describing vehicle miles of travel by average speed. A few guidelines should be observed in developing these data:

- Ideally, the analysis area should be confined to the area potentially impacted by the proposed alternative in order to minimize processing of unnecessary data.

- If the analysis is intended to identify changes in emissions produced by a particular market group or category of trip purpose, data should be defined for the specified travel market and should be consistent between scenarios. Markets that are unaffected or that remain constant as a result of the scenario can be "zeroed out."

- The season or time period covered by the data should be consistent for comparable scenarios.

The spreadsheet is organized into two parts: an emission factor look-up table, and a section that integrates travel data and emission factors to sum and compare total emissions between scenarios. Two spreadsheet templates are provided: 1990TEST.WK1 to analyze year 1990 impacts, and 2010TEST.WK1 for year 2010 impacts.

The following sections describe the data used in these sections and the operation of the overall spreadsheet.

### 4.3.1 Emission Factors

In the prototype Total Emissions Spreadsheet, emission factors were generated for a range of speeds using EPA's recently-released draft MOBILE5 emission factor model. Inputs for MOBILE5 to produce 1990 emission factors were obtained from the Illinois Environmental Protection Agency and are consistent with inputs used in IEPA's 1990 input file for the State Implementation Plan (SIP) inventory. The IEPA input file is included in Appendix B.

Inputs can be modified as necessary to obtain emission factors representing different conditions (e.g., inspection/maintenance program, fuel programs), analysis years, and/or seasons. At this time, Illinois has not determined the design of the state's future inspection/maintenance program. Inspection/maintenance programs must be modified in response to 1990 Clean Air Act Amendments requirements for severe ozone non-attainment areas. Therefore, to simulate year 2010 emission factors for use in the Total Emissions Spreadsheet, MOBILE5 was run with an

input file that duplicates U.S. EPA's recommended enhanced inspection/maintenance performance standards. Once the final design of the Illinois inspection/maintenance program is determined, MOBILE5 can be rerun to reflect any discrepancies between U.S. EPA's model program and the program that Illinois ultimately implements.

The MOBILE model is run independently from the Total Emissions Spreadsheet, and the resulting emission factors are then entered into the look-up table of the spreadsheet. Information on the operation of the MOBILE model can be found in the User's Guide to MOBILE4.1 and the addendum prepared for the draft version of MOBILE5.

Because of concern over issues related to cold start impacts, it should be noted that IEPA input file used to develop the emission factors included in the prototype spreadsheet assumes national default characteristics in the operating mode fractions and trip length distributions. However, as discussed in the MOBILE User's Guide, operating mode fractions can be modified in the scenario section to reflect more localized conditions. Localized trip length distributions can also be specified through options provided under the SPDFLG. In both cases, these options can be used to more precisely determine emission factors for travel conditions and/or travel markets affected by strategies that might affect trip lengths and/or cold start percentages. The ability to specify localized characteristics in these cases is dependent upon the availability of travel data at a level of detail which can reasonably quantify the characteristics of the affected market groups.

### 4.3.2 Travel Data

As indicated above, travel data is entered into the spreadsheet in the form of vehicle miles of travel (VMT) at a corresponding travel speed. The disaggregation of these data is dependent upon the level of detail available through the output of the travel demand model used to analyze a given alternative. Travel demand model output should be formatted in a manner that facilitates integration into the Total Emissions Spreadsheet to minimize the need for manual data entry.

Travel data can be input into the Total Emissions Spreadsheet in the form of total travel for an entire study area or, depending upon data availability and analysis needs, disaggregated by geographic area, vehicle type, time of day, or trip purpose. (For more detailed analysis, the general approach used in the spreadsheet can be applied at the roadway link level, although this more data-intensive approach necessitates a more direct integration of the MOBILE model with the travel demand model for the study area.)

The spreadsheet is designed to accept data in the form of VMT at a given speed. If the data are available in some form other than VMT by speed, such as VMT by speed for individual zone pairs, the spreadsheet can be modified accordingly, depending upon the format of the data.

Although VMT by speed is generated for the A.M. peak hour, the results of the emissions calculations are presented in tons per day. The peak-hour emissions have been factored to daily emissions on the basis of the relationship between daily transit travel and peak-hour transit travel. A factor of 4 is derived from the following condition and assumptions:

- The A.M. peak hour contains 40 percent of the home-to-work transit trips.
- The P.M. peak hour contains 37 percent of the work-to-home trips.
- The majority of home-to-work trips occur in the A.M. peak period.
- The majority of work-to-home trips occur in the P.M. peak period.
- The home-to-work trips are equivalent to the work-to-home trips.

Multiplying the A.M. peak-hour emissions results by 4 represents expanding the A.M. peak hour to a two-hour A.M. peak period and a two-hour P.M. peak period, and also represents a conservative estimate of daily emissions because the A.M. and P.M. peak hours include 80 percent of the daily transit trips.

# 5.
# Evaluation Results

As discussed in Chapter 4, the output of the travel demand impact methodology is changes in vehicle miles traveled (VMT) by speed category for 1990 and 2010. These data are then input into the emissions spreadsheet, which produces changes in emissions. This chapter presents the analysis results for each TCM, including:

- Area of Impact: Identifies the impacted origin and destination zones. Zones are based on CATS travel analysis zones.
- Primary Travel Markets Impacted: Identifies what type of trips are affected, e.g., CBD work trips, nonwork trips, etc.
- Travel Time and Cost Impacts: Identifies the impacted mode choice model component, e.g. travel time, cost, etc., which causes a change in travel mode.
- Number of Zones: Identifies the number of travel analysis zones that are affected by changes in VMT and emissions are distributed among.
- Changes in Peak VMT: By CBD work, nonCBD work, and nonwork trips. Presented in A.M. peak hour VMT.
- Changes in Daily Emissions: Includes volatile organic compounds (VOCs), carbon monoxide (CO), and nitrogen oxide ($NO_x$). The emissions calculations in Appendix C generate A.M. peak-hour emissions, which are then multiplied by 4 (as described on page 21) to generate tons per day.
- Trip Summary Table for A.M. Peak Hour: Summarizes total base auto trips, base transit trips, revised auto trips, and revised transit trips by trip purpose. Base auto and transit trips come directly from the CATS model for each alternative. New auto trips are the product of total trips and the new auto share as derived using the incremental logit process. (Where the incremental logit process could not be applied, an abbreviated trip summary is provided.)
- Other comments related to time of day travel and potential secondary impacts.

A map of the impacted area is shown for each TCM. The emissions calculations for each TCM are included in Appendix C.

Transportation Control Measure

#1: West Chicago Metra station park-n-ride lot. Additional park-n-ride lot with 255 spaces is added to the West Chicago station.

Primary Travel Market Impacted

CBD work trips.

Area of Impact

Origin: Travel shed for the West Chicago Metra station, including West Chicago, Batavia, St. Charles, Warrenville, and Geneva.

Destination: One mile corridor between Warrenville and downtown Chicago (excluding West Chicago).

Travel Time and Cost Impacts

Reduced Access Time: (-10) minutes for all zonal interchanges. With more parking available in West Chicago, reduces number of commuters who drive to park-n-ride lots located farther away.

Results

Number of Origin Zones: 11

Number of Destination Zones:

| | |
|---|---|
| CBD | 12 |
| NonCBD | 35 |
| Nonwork | 47 |

Total Zonal Interchanges for Change in VMT Calculations:

| | |
|---|---|
| CBD | 132 |
| NonCBD | 385 |
| Nonwork | 517 |

Changes in A.M. Peak Hour VMT:

| | | |
|---|---|---|
| 1990 | Work CBD | -274 |
| | Work NonCBD | -36 |
| | Nonwork | 0 |
| 2010 | Work CBD | -806 |
| | Work NonCBD | -32 |
| | Nonwork | -1 |

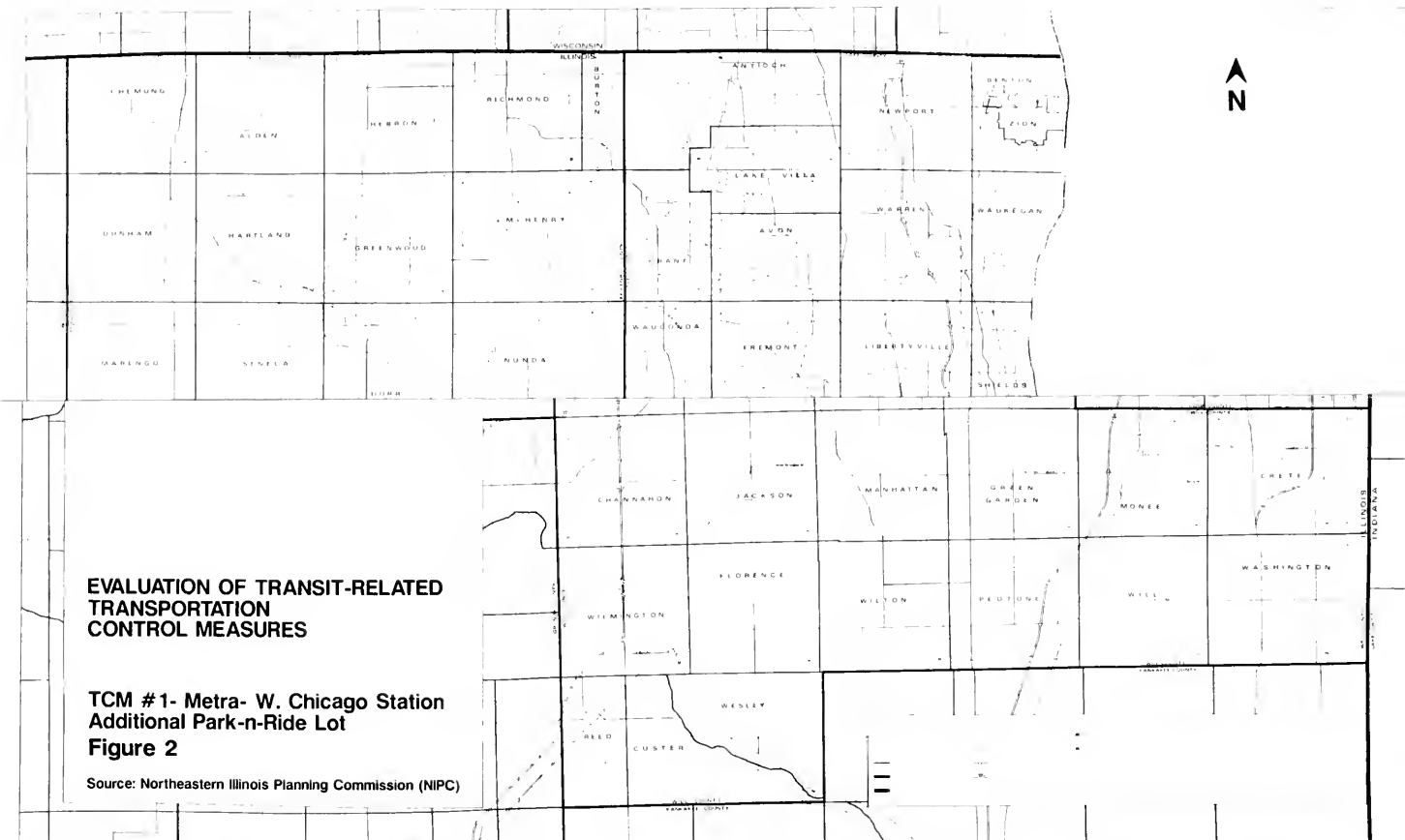
Changes in Emissions (Tons per day):

| | | |
|---|---|---|
| 1990 | VOCs | -0.004 |
| | CO | -0.028 |
| | NOx | -0.004 |
| 2010 | VOCs | -0.004 |
| | CO | -0.024 |
| | NOx | -0.004 |

| TRIP SUMMARY - A.M. PEAK HOUR | | | | |
|---|---|---|---|---|
| | Trip Type | | | |
| Trip Purpose | Base Auto Trips | Base Transit Trips | Revised Auto Trips | Revised Transit Trips |
| **1990** | | | | |
| Work-CBD | 22 | 443 | 14 | 451 |
| Work-NonCBD | 1,589 | 26 | 1,578 | 37 |
| Nonwork | 915 | 0 | 915 | 0 |
| **2010** | | | | |
| Work-CBD | 65 | 661 | 43 | 683 |
| Work-NonCBD | 1,959 | 35 | 1,947 | 47 |
| Nonwork | 1,134 | 5 | 1,133 | 6 |

Comments

Park-n-ride lots generally do not eliminate auto trips, but reduce travel times and distances to the nearest facility from the home origin. As a result, VMT is reduced, but since trips are not eliminated, effectiveness as an air quality measure is limited by the amount of travel conducted with vehicle in cold start mode. This TCM impacts primarily peak-period trips, reducing total travel time approximately 10 to 20 percent.

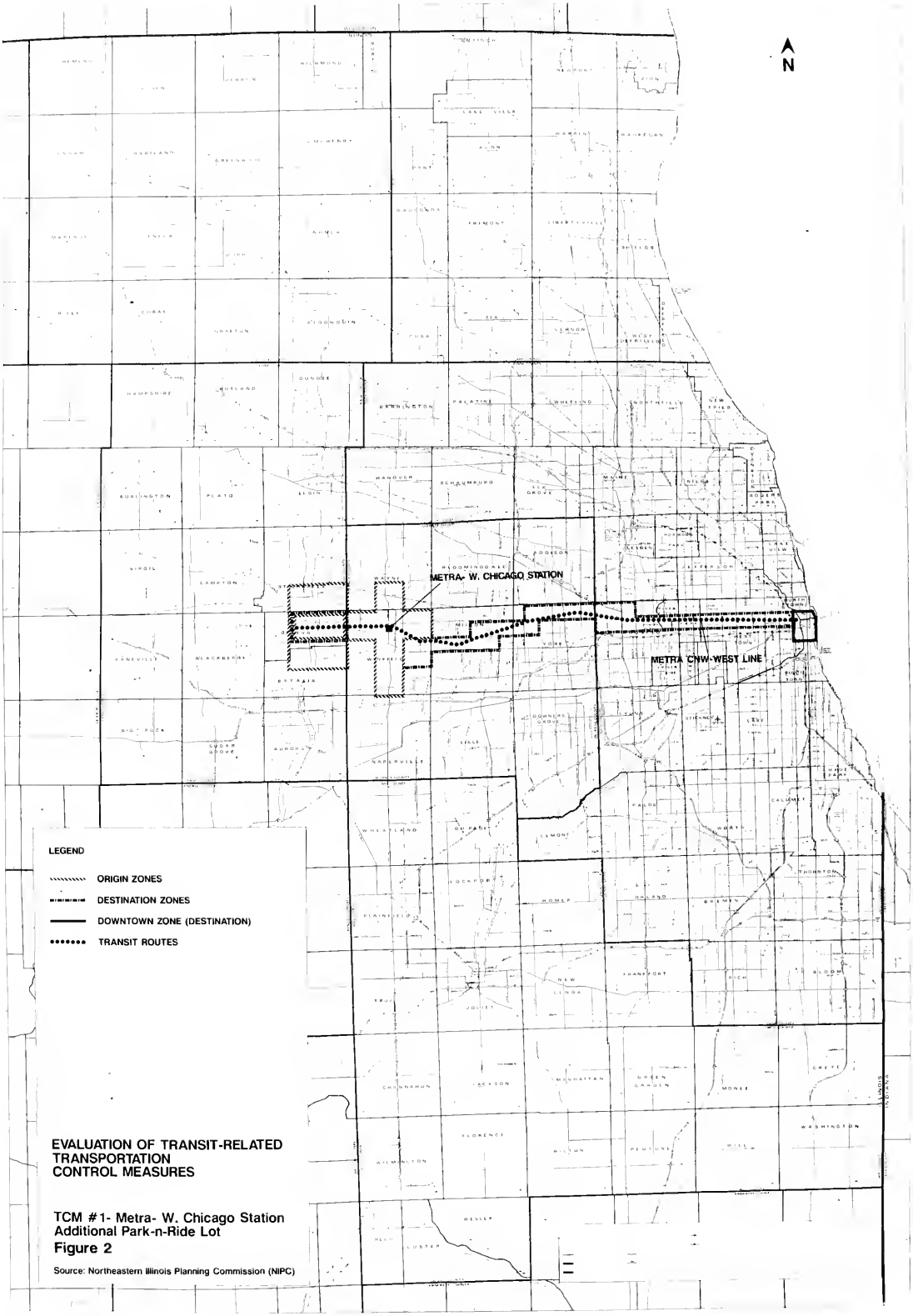



**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #1- Metra- W. Chicago Station Additional Park-n-Ride Lot**

**Figure 2**

Source: Northeastern Illinois Planning Commission (NIPC)




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

TCM #1- Metra- W. Chicago Station Additional Park-n-Ride Lot

**Figure 2**

Source: Northeastern Illinois Planning Commission (NIPC)

Transportation Control Measure

#2: Cumberland Park-n-Ride Lot, O'Hare CTA line. An additional 750 parking spaces have been added to the Cumberland park-n-ride lot.

Primary Travel Markets Impacted

CBD work trips, nonCBD work trips.

Area of Impact

Origin: Cumberland station travel shed, including the CTA River Road station, Hoffman Estates, Des Plaines, Arlington Heights and Mount Prospect.

Destination: All zones between Harlem Ave. and downtown Chicago.

Travel Time and Cost Impacts

Reduced Access Time: (-3) minutes for all zonal interchanges. With additional parking, reduces the number of commuters who may drive to the River Road station.

Results

Number of Origin Zones 29

Number of Destination Zones:

| | |
|---|---|
| CBD | 10 |
| NonCBD | 22 |
| Nonwork | 32 |

Total Zonal Interchanges for Change in VMT Calculations:

| | |
|---|---|
| CBD | 290 |
| NonCBD | 638 |
| Nonwork | 928 |

Changes in A.M. Peak Hour VMT:

| | | |
|---|---|---|
| 1990 | Work CBD | -317 |
| | Work NonCBD | -72 |
| | Nonwork | -3 |
| 2010 | Work CBD | -204 |
| | Work NonCBD | -43 |
| | Nonwork | -1 |

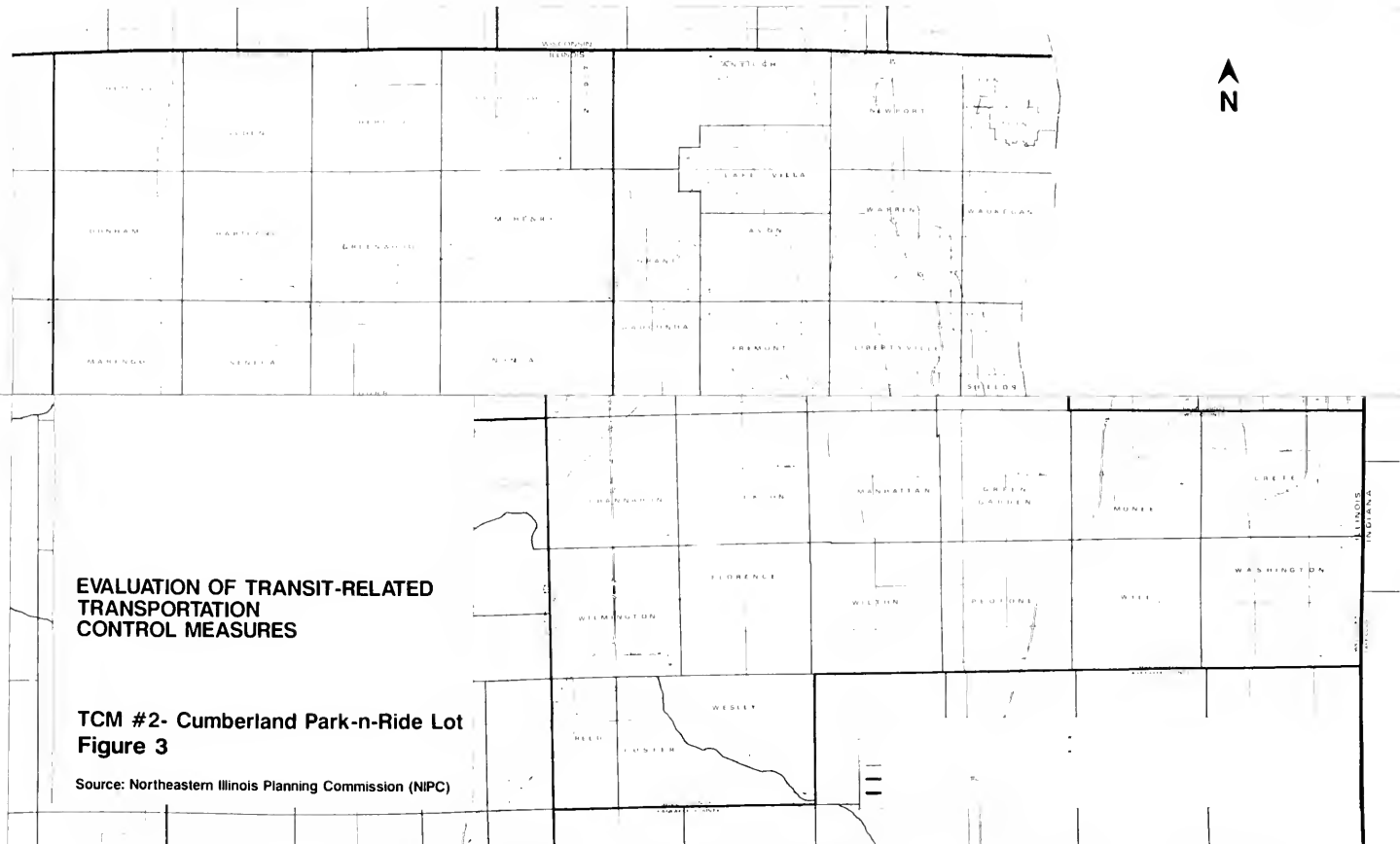
Changes in Emissions (Tons per day):

| | | |
|---|---|---|
| 1990 | VOCs | -0.008 |
| | CO | -0.040 |
| | NOx | -0.004 |
| 2010 | VOCs | -0.000 |
| | CO | -0.008 |
| | NOx | -0.000 |

| TRIP SUMMARY - A.M. PEAK HOUR | | | | |
|---|---|---|---|---|
| | Trip Type | | | |
| Trip Purpose | Base Auto Trips | Base Transit Trips | Revised Auto Trips | Revised Transit Trips |
| **1990** | | | | |
| Work-CBD | 177 | 1,514 | 158 | 1,533 |
| Work-NonCBD | 508 | 86 | 497 | 97 |
| Nonwork | 142 | 37 | 142 | 37 |
| **2010** | | | | |
| Work-CBD | 111 | 1,629 | 98 | 1,642 |
| Work-NonCBD | 311 | 55 | 305 | 61 |
| Nonwork | 146 | 38 | 146 | 38 |

Comments

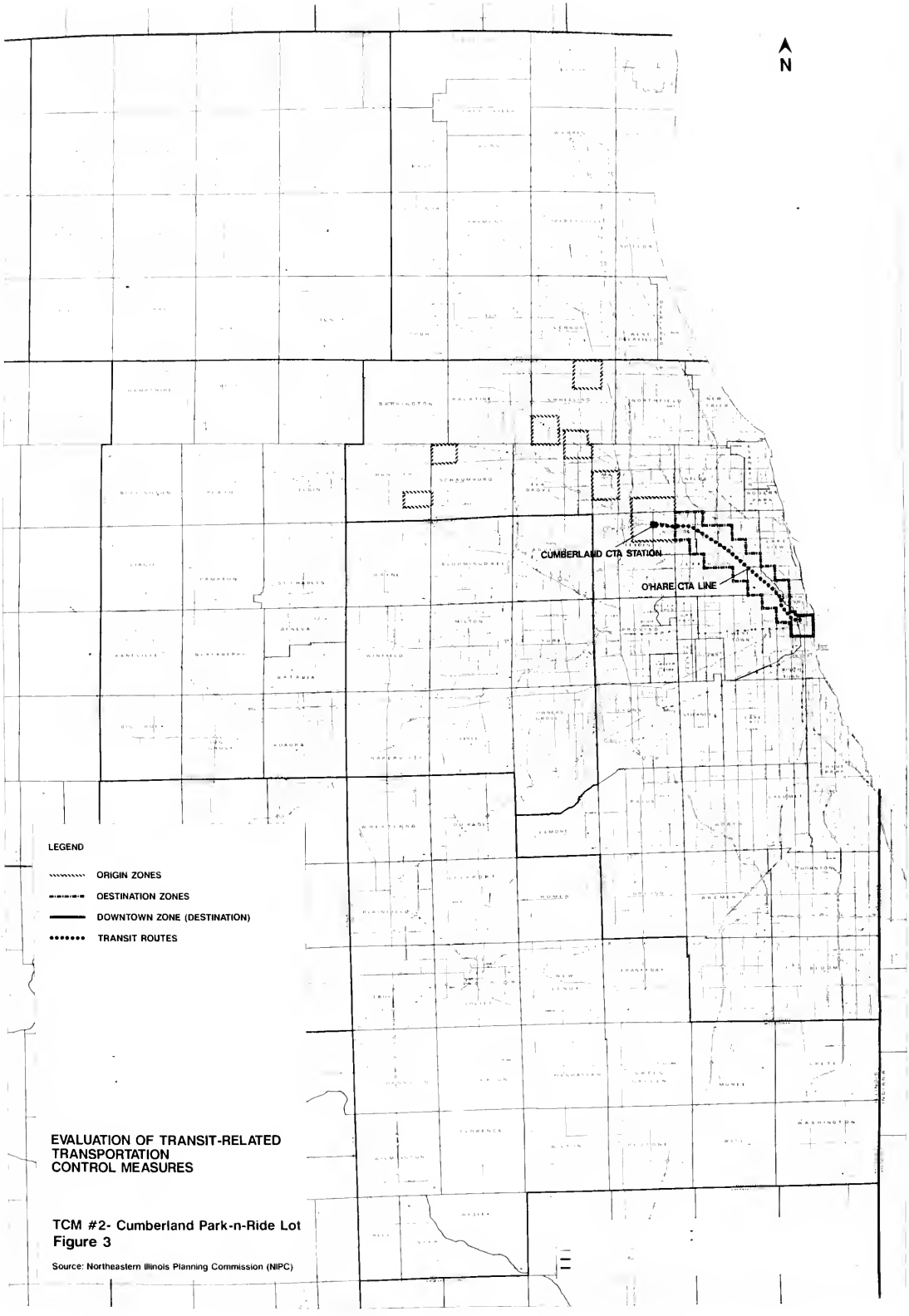
Providing park-n-ride spaces generally does not eliminate auto trips, but reduces travel times and distances to the nearest facility from the home origin. As a result, VMT is reduced, but since trips are not eliminated, effectiveness as an air quality measure is limited by the amount of travel conducted with vehicle in cold start mode. This TCM impacts primarily peak-period trips, reducing total travel time approximately 5 percent.




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #2- Cumberland Park-n-Ride Lot**
**Figure 3**

Source: Northeastern Illinois Planning Commission (NIPC)




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #2- Cumberland Park-n-Ride Lot**
**Figure 3**

Source: Northeastern Illinois Planning Commission (NIPC)

Transportation Control Measure

#3: CTA-95th St. Transit Station Redesign. Expansion of platform and bus bridge.

Primary Travel Markets Impacted

CBD work trips, nonCBD work trips, nonwork trips.

Area of Impact

Origin: Two mile radius around the 95th St. Station.

Destination: All zones between 95 St. and downtown Chicago.

Travel Time and Cost Impacts

Reduced Access Time: (-2) minutes for origins around station based on more efficient bus operations.

Reduced Out-of-Vehicle (Transfer) Time: (-3) minutes for remainder of origins based on reduced time transferring between bus and rail.

Results

Number of Origin Zones 12

Number of Destination Zones:

| | |
|---|---|
| CBD | 9 |
| NonCBD | 18 |
| Nonwork | 27 |

Total Zonal Interchanges for Change in VMT Calculations:

| | |
|---|---|
| CBD | 108 |
| NonCBD | 216 |
| Nonwork | 324 |

Changes in A.M. Peak Hour VMT:

| | | |
|---|---|---|
| 1990 | Work CBD | -432 |
| | Work NonCBD | -131 |
| | Nonwork | -98 |
| 2010 | Work CBD | -410 |
| | Work NonCBD | -152 |
| | Nonwork | -87 |

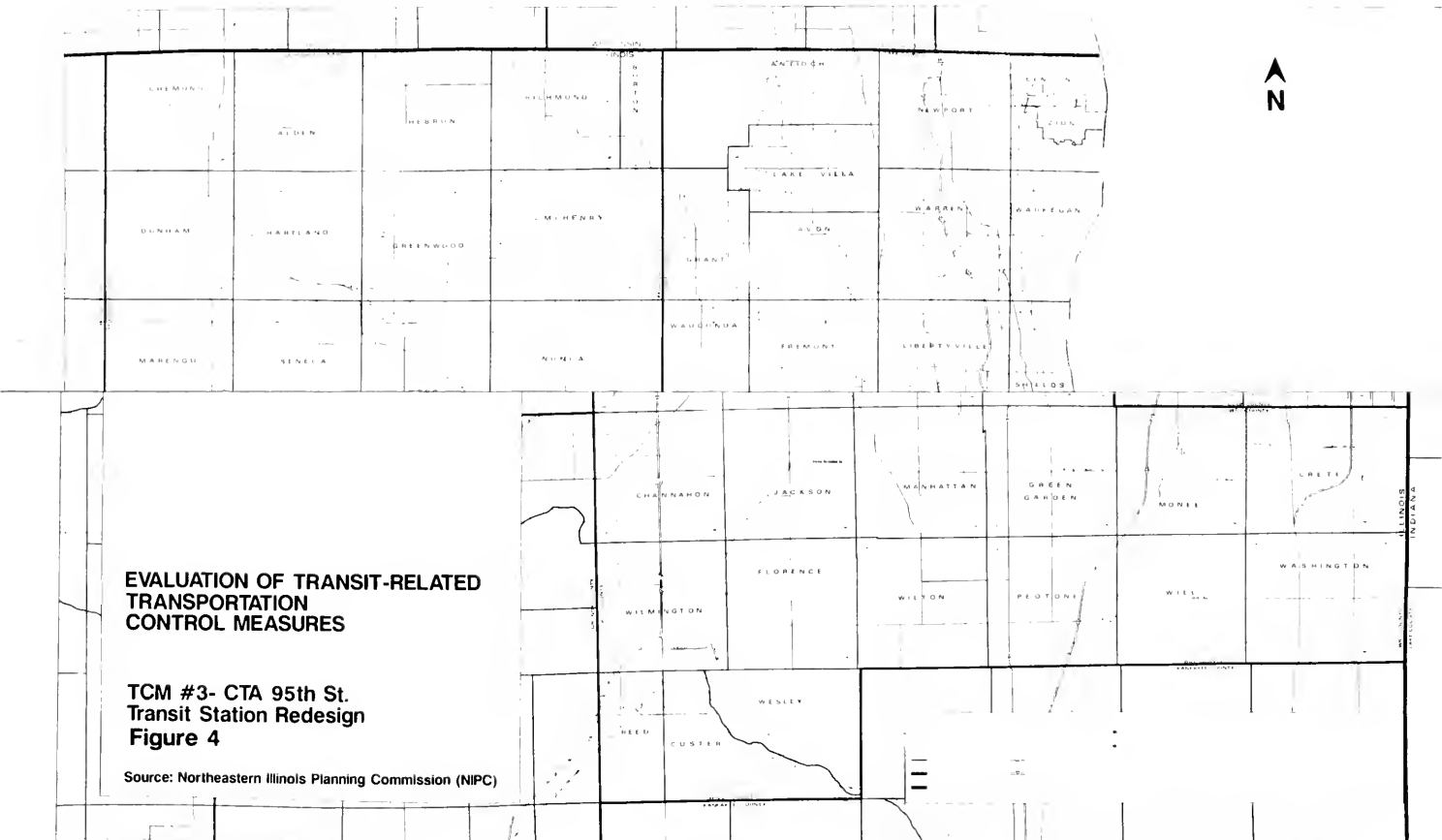
Changes in Emissions (Tons per day):

| | | |
|---|---|---|
| 1990 | VOCs | -0.012 |
| | CO | -0.068 |
| | NOx | -0.008 |
| 2010 | VOCs | -0.004 |
| | CO | -0.024 |
| | NOx | -0.004 |

| TRIP SUMMARY - A.M. PEAK HOUR | | | | |
|---|---|---|---|---|
| | Trip Type | | | |
| Trip Purpose | Base Auto Trips | Base Transit Trips | Revised Auto Trips | Revised Transit Trips |
| **1990** | | | | |
| Work-CBD | 837 | 2,449 | 799 | 2,487 |
| Work-NonCBD | 565 | 482 | 547 | 500 |
| Nonwork | 174 | 417 | 163 | 428 |
| **2010** | | | | |
| Work-CBD | 787 | 2,159 | 751 | 2,195 |
| Work-NonCBD | 531 | 531 | 511 | 551 |
| Nonwork | 126 | 451 | 116 | 461 |

Comments

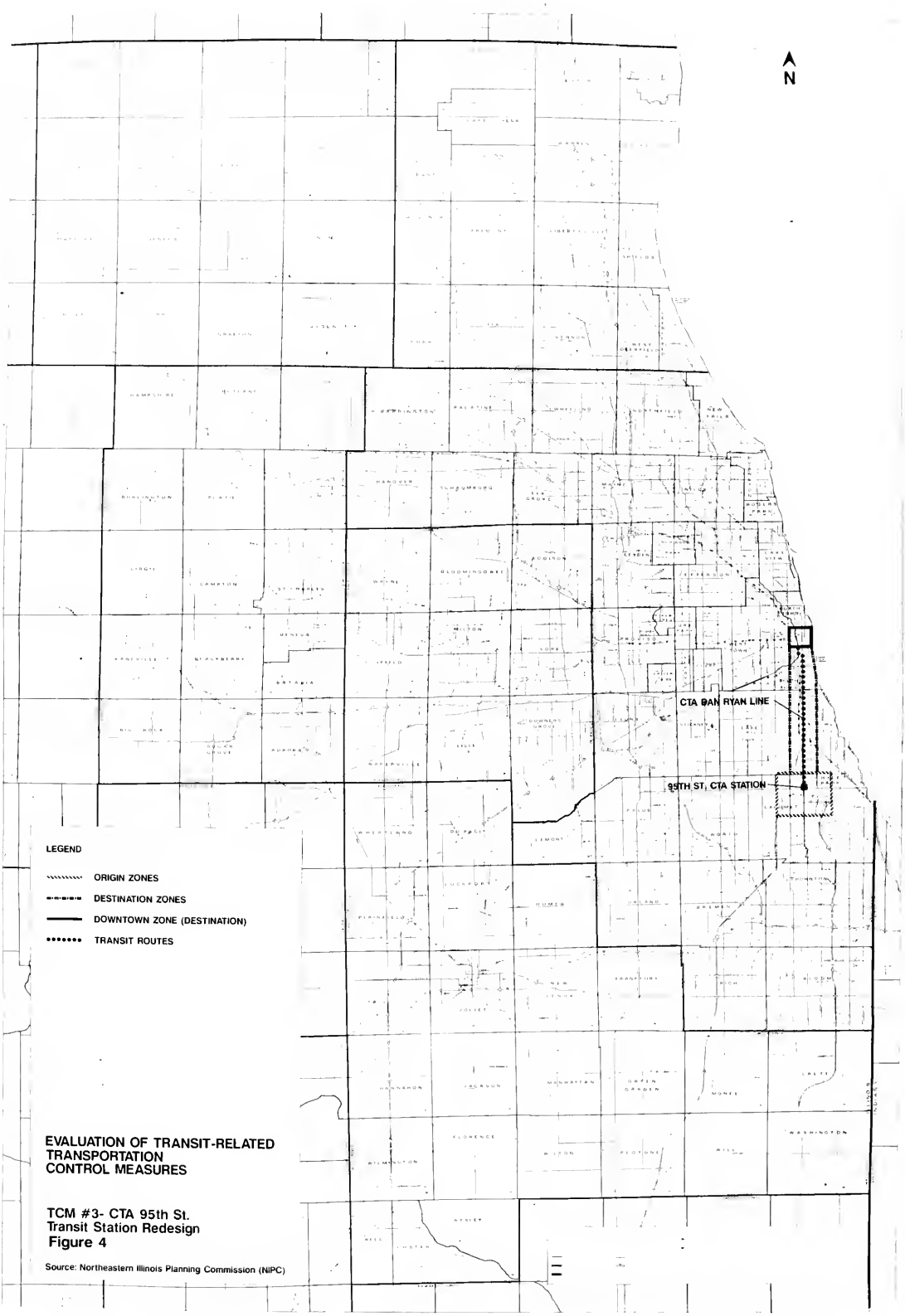
Improvements to the efficiency of the transit station primarily impact peak period work trips, as this is the most congested travel period causing the greatest delays. Should reduce bus running times and idling times, contributing to further air quality improvements in the vicinity of the station as a result of reduced bus emissions. May reduce total travel time by approximately 5 to 10 percent.




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #3- CTA 95th St. Transit Station Redesign**
**Figure 4**

Source: Northeastern Illinois Planning Commission (NIPC)




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #3- CTA 95th St. Transit Station Redesign**
**Figure 4**

Source: Northeastern Illinois Planning Commission (NIPC)

Transportation Control Measure

#4: Schaumburg Transportation Center/Transfer Facility. New Woodfield transit center.

Primary Travel Market Impacted

Non CBD work and nonwork trips.

Area of Impact

Origin: One mile zone on each side of the 5 bus routes serving Woodfield.

Destination: Same as origin zones.

Travel Time and Cost Impacts

Reduced Out-of-Vehicle Time: Actual reduction based on existing transfer times. The new transfer time will be 0, where previously ranged from 5 to 20 minutes.

Results

Number of Origin Zones 84

Number of Destination Zones:

| | |
|---|---|
| CBD | 0 |
| NonCBD | 67 |
| Nonwork | 67 |

Total Zonal Interchanges for Change in VMT Calculations:

| | |
|---|---|
| CBD | 0 |
| NonCBD | 5628 |
| Nonwork | 5628 |

Changes in A.M. Peak Hour VMT:

| | | |
|---|---|---|
| 1990 | Work CBD | 0 |
| | Work NonCBD | -20 |
| | Nonwork | 0 |
| 2010 | Work CBD | 0 |
| | Work NonCBD | -137 |
| | Nonwork | 0 |

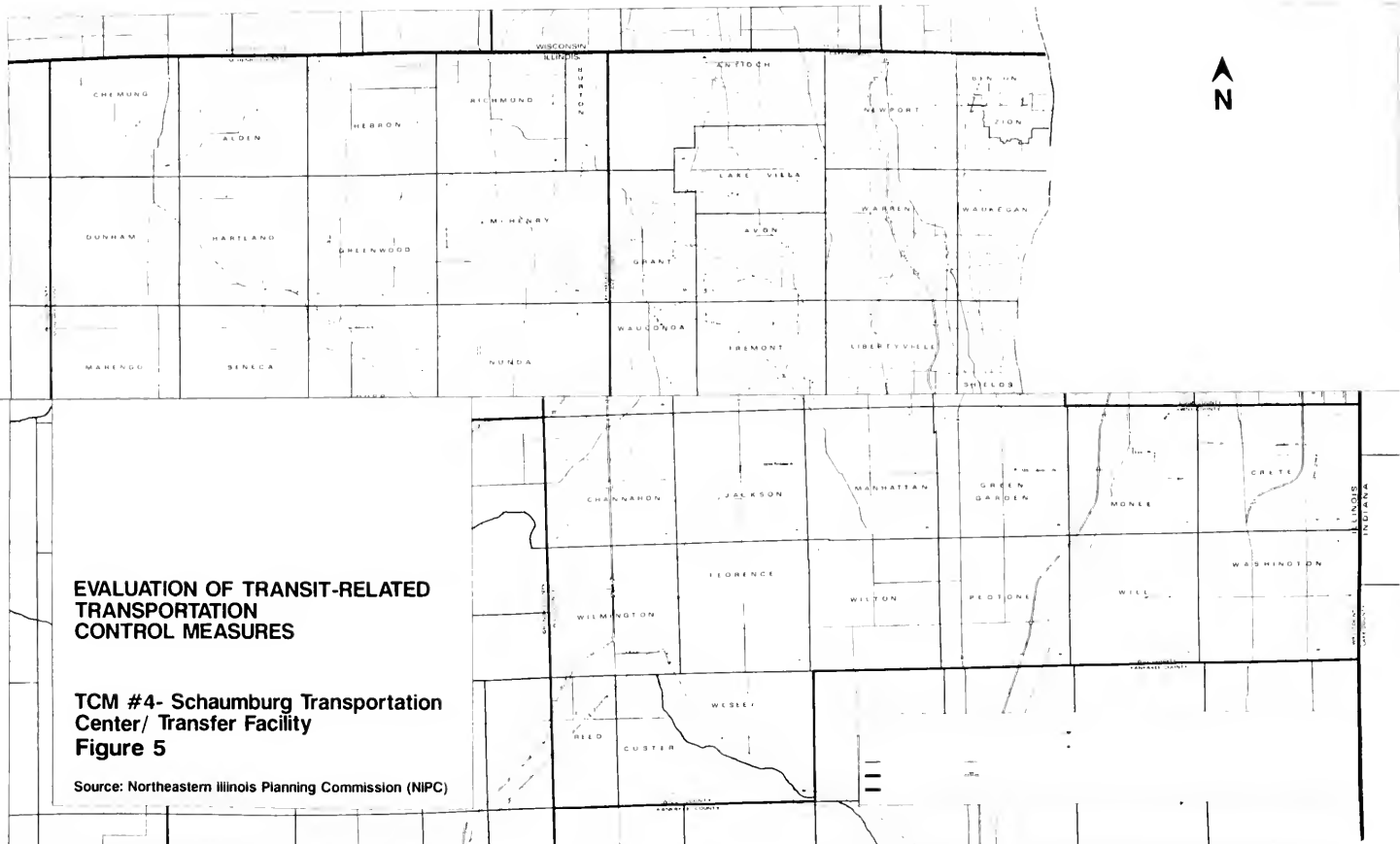
Changes in Emissions (Tons per day):

| | | |
|---|---|---|
| 1990 | VOCs | 0.000 |
| | CO | -0.004 |
| | NOx | -0.000 |
| 2010 | VOCs | 0.000 |
| | CO | -0.004 |
| | NOx | 0.000 |

| TRIP SUMMARY - A.M. PEAK HOUR | | | | |
|---|---|---|---|---|
| | Trip Type | | | |
| Trip Purpose | Base Auto Trips | Base Transit Trips | Revised Auto Trips | Revised Transit Trips |
| **1990** | | | | |
| Work-CBD | 0 | 0 | 0 | 0 |
| Work-NonCBD | 15,661 | 184 | 15,658 | 187 |
| Nonwork | 8,217 | 75 | 8,217 | 75 |
| **2010** | | | | |
| Work-CBD | 0 | 0 | 0 | 0 |
| Work-NonCBD | 20,410 | 399 | 20,392 | 417 |
| Nonwork | 8,286 | 49 | 8,286 | 49 |

Comments

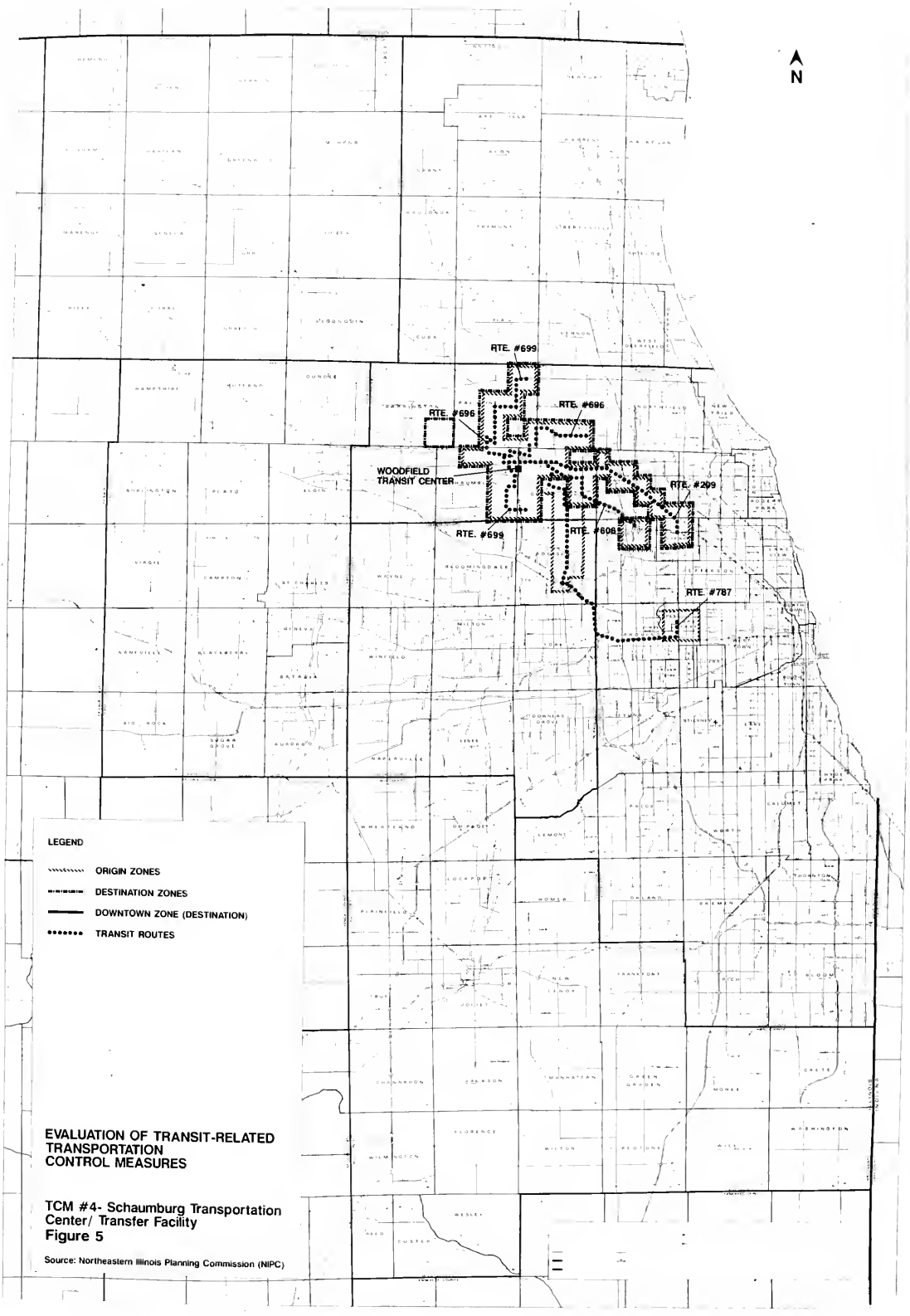
Impacts both peak and off-peak trips. Since existing transfer is inefficient, out-of-vehicle travel time (OVTT) is relatively high. Pulsing of bus operations can reduce wait time, or OVTT, making transit a more desirable alternative to auto travel. Resulting mode switches can potentially generate significant emission reductions. This TCM may also reduce bus vehicle miles while increasing efficiency. Emissions may also be reduced by decreased bus idling. May reduce total travel time by approximately 10 to 25 percent.




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #4- Schaumburg Transportation Center/ Transfer Facility**
**Figure 5**

Source: Northeastern Illinois Planning Commission (NIPC)




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #4- Schaumburg Transportation Center/ Transfer Facility**
**Figure 5**

Source: Northeastern Illinois Planning Commission (NIPC)

Transportation Control Measure

#5: Wood Dale Metra Station Distributor Bus Route. New bus route to distribute reverse commuters to work destinations.

Primary Travel Markets Impacted

NonCBD work trips.

Area of Impact

Origin: One mile zone on each side of the Milwaukee-West line from Elgin to Chicago, excluding Wood Dale.

Destination: Two mile radius around station.

Travel Time and Cost Impacts

Increased Transit Cost: $0.85 one-way cash fare for transfer between bus and rail (converted to 1970 dollars).

Increased Out-of-Vehicle Time: + 2 minutes for train to bus transfer time.

Reduced In-Vehicle Time: (-5) minutes to zones 760, 766, 767; (-3) minutes to zone 761 based on previous walk times.

Results

Number of Origin Zones 68

Number of Destination Zones:

| | |
|---|---|
| CBD | 0 |
| NonCBD | 14 |
| Nonwork | 14 |

Total Zonal Interchanges for Change in VMT Calculations:

| | |
|---|---|
| CBD | 0 |
| NonCBD | 952 |
| Nonwork | 952 |

Changes in A.M. Peak Hour VMT:

| | | |
|---|---|---|
| 1990 | Work CBD | 0 |
| | Work NonCBD | 16 |
| | Nonwork | 0 |

| | | |
|---|---|---|
| 2010 | Work CBD | 0 |
| | Work NonCBD | 69 |
| | Nonwork | 0 |

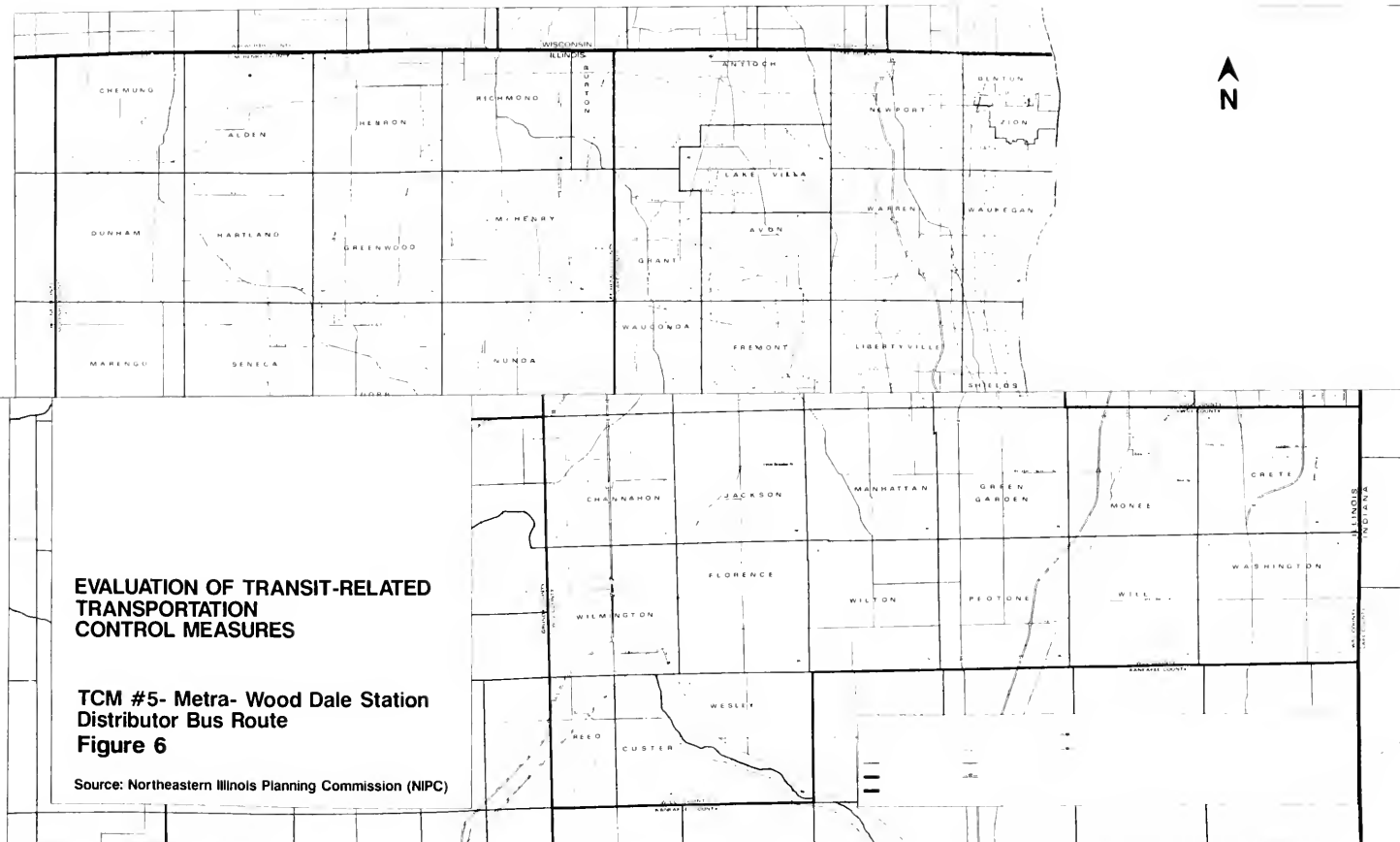
Changes in Emissions (Tons per day):

| | | |
|---|---|---|
| 1990 | VOCs | 0.000 |
| | CO | 0.000 |
| | NOx | 0.000 |
| 2010 | VOCs | 0.000 |
| | CO | 0.004 |
| | NOx | 0.000 |

| TRIP SUMMARY - A.M. PEAK HOUR | | | | |
|---|---|---|---|---|
| | Trip Type | | | |
| Trip Purpose | Base Auto Trips | Base Transit Trips | Revised Auto Trips | Revised Transit Trips |
| **1990** | | | | |
| Work-CBD | 0 | 0 | 0 | 0 |
| Work-NonCBD | 2,085 | 24 | 2,087 | 22 |
| Nonwork | 417 | 0 | 417 | 0 |
| **2010** | | | | |
| Work-CBD | 0 | 0 | 0 | 0 |
| Work-NonCBD | 4,002 | 59 | 4,011 | 50 |
| Nonwork | 664 | 0 | 664 | 0 |

Comments

Impacts peak-period travel only. Eliminates some auto trips (and associated cold starts) due to improvement in transit in-vehicle time. However, due to sensitivity to increased cost (new transfer cost), mode switches are limited, and emissions actually increase.

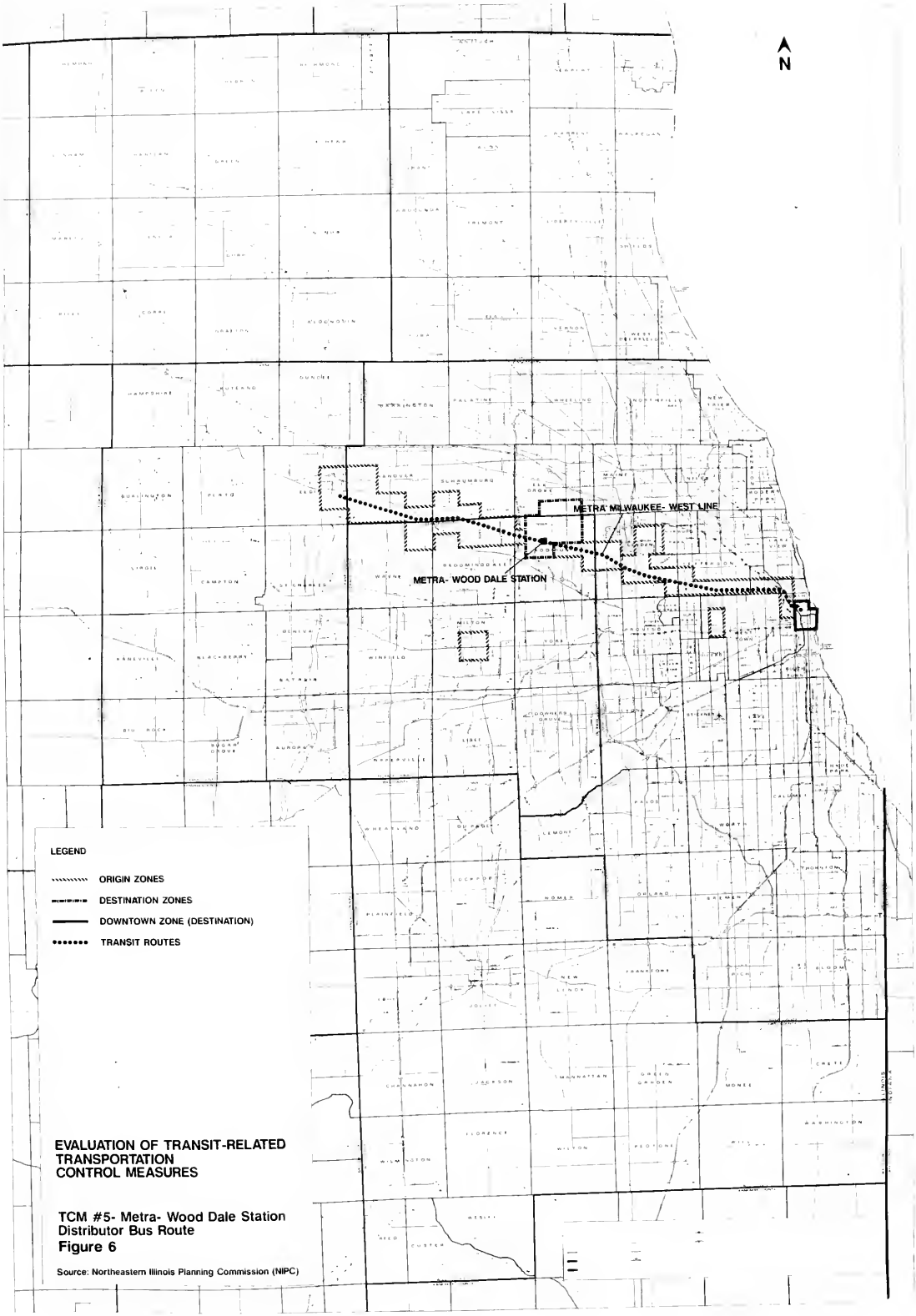



**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #5- Metra- Wood Dale Station Distributor Bus Route**

**Figure 6**

Source: Northeastern Illinois Planning Commission (NIPC)




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #5- Metra- Wood Dale Station Distributor Bus Route**
**Figure 6**

Source: Northeastern Illinois Planning Commission (NIPC)

Transportation Control Measure

#6: Cermak Ave. Bus Signal Preemption.

Primary Travel Markets Impacted

All trips.

Area of Impact

Origin: All zones along Cermak Ave. between Harlem Ave. and downtown Chicago.

Destination: Same as origin zones.

Travel Time and Cost Impacts

Reduced In-Vehicle Time: (-3) seconds per signalized intersection. Includes 15 signalized intersections.

Results

Number of Origin Zones 51

Number of Destination Zones:

| | |
|---|---|
| CBD | 9 |
| NonCBD | 42 |
| Nonwork | 51 |

Total Zonal Interchanges for Change in VMT Calculations:

| | |
|---|---|
| CBD | 459 |
| NonCBD | 2142 |
| Nonwork | 2601 |

Changes in A.M. Peak Hour VMT:

| | | |
|---|---|---|
| 1990 | Work CBD | -51 |
| | Work NonCBD | -7 |
| | Nonwork | -2 |
| 2010 | Work CBD | -64 |
| | Work NonCBD | -8 |
| | Nonwork | -2 |

Changes in Emissions (Tons per day):

| | | |
|---|---|---|
| 1990 | VOCs | -0.000 |
| | CO | -0.008 |
| | NOx | -0.000 |
| 2010 | VOCs | -0.000 |
| | CO | -0.004 |
| | NOx | -0.000 |

TRIP SUMMARY - A.M. PEAK HOUR

| | Trip Type | | | |
|---|---|---|---|---|
| Trip Purpose | Base Auto Trips | Base Transit Trips | Revised Auto Trips | Revised Transit Trips |
| **1990** | | | | |
| Work-CBD | 3,670 | 10,171 | 3,665 | 10,176 |
| Work-NonCBD | 7,932 | 1,901 | 7,931 | 1,902 |
| Nonwork | 3,274 | 1,242 | 3,274 | 1,242 |
| **2010** | | | | |
| Work-CBD | 4,607 | 12,535 | 4,601 | 12,541 |
| Work-NonCBD | 7,784 | 2,342 | 7,783 | 2,343 |
| Nonwork | 2,768 | 1,673 | 2,768 | 1,673 |

Comments

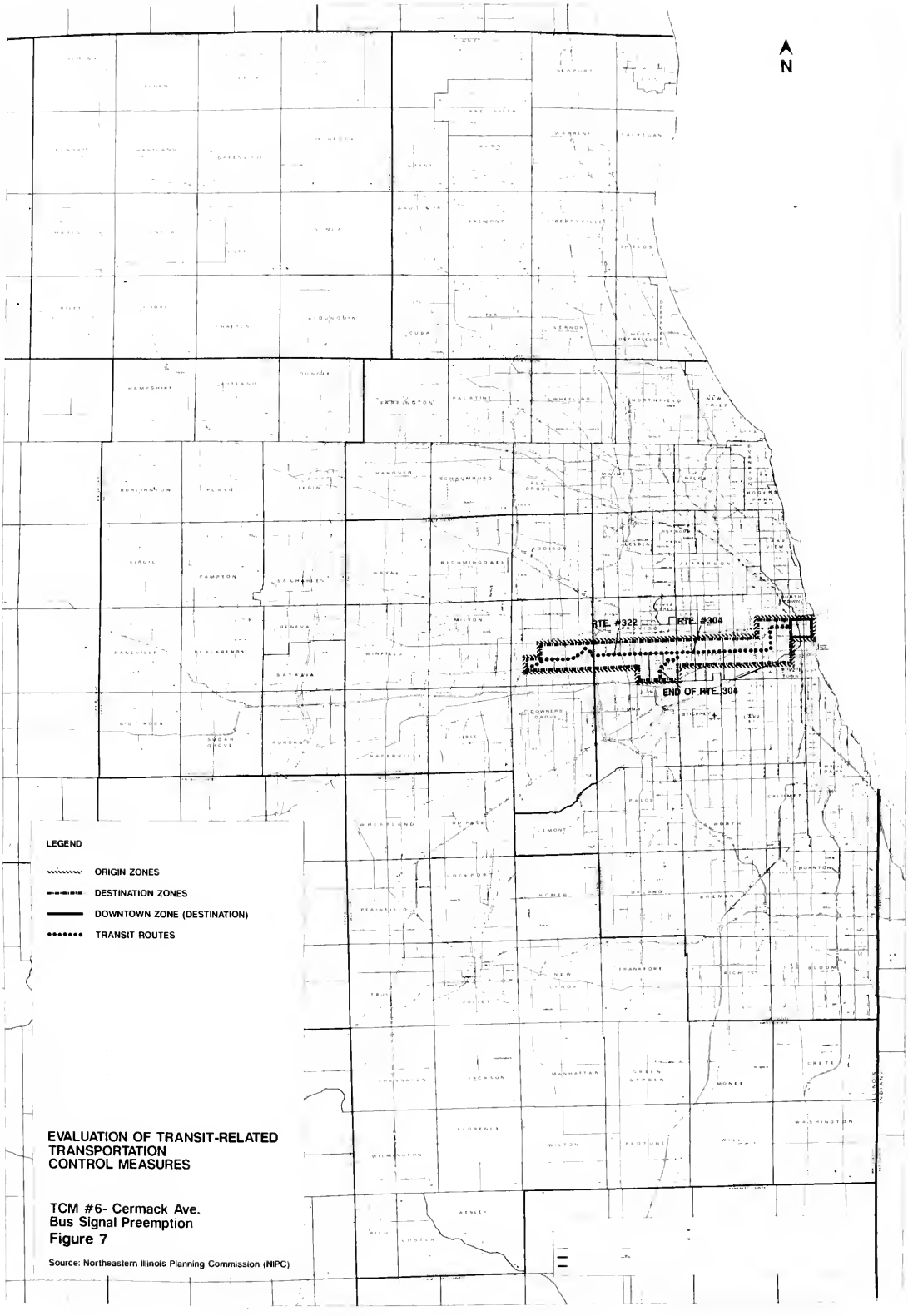
Affects peak and off-peak trips. Does not eliminate auto trips, but reduces travel time. Signal preemption increases travel speed, which generates emissions reductions. Signal preemption affects both buses and autos. May decrease total travel time by less than 5 percent.


**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #6- Cermack Ave. Bus Signal Preemption**

**Figure 7**

Source: Northeastern Illinois Planning Commission (NIPC)




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #6- Cermack Ave. Bus Signal Preemption**
**Figure 7**

Source: Northeastern Illinois Planning Commission (NIPC)

Transportation Control Measure

#7: I-294 Toll Plaza Bypass.

Primary Travel Markets Impacted

NonCBD work trips.

Area of Impact

Origin: One mile zone around bus pick-up points at southern end of routes

Destination: One mile zone around bus drop-off points at western end of line near Downers Grove and Lisle.

Travel Time and Cost Impacts

Reduced In-Vehicle Time: (-15) minutes based on current delays being experienced.

Results

Number of Origin Zones 24

Number of Destination Zones:

| | |
|---|---|
| CBD | 0 |
| NonCBD | 15 |
| Nonwork | 15 |

Total Zonal Interchanges for Change in VMT Calculations:

| | |
|---|---|
| CBD | 0 |
| NonCBD | 360 |
| Nonwork | 360 |

Changes in A.M. Peak Hour VMT:

| | | |
|---|---|---|
| 1990 | Work CBD | 0 |
| | Work NonCBD | -128 |
| | Nonwork | 0 |

Changes in Emissions (Tons per day):

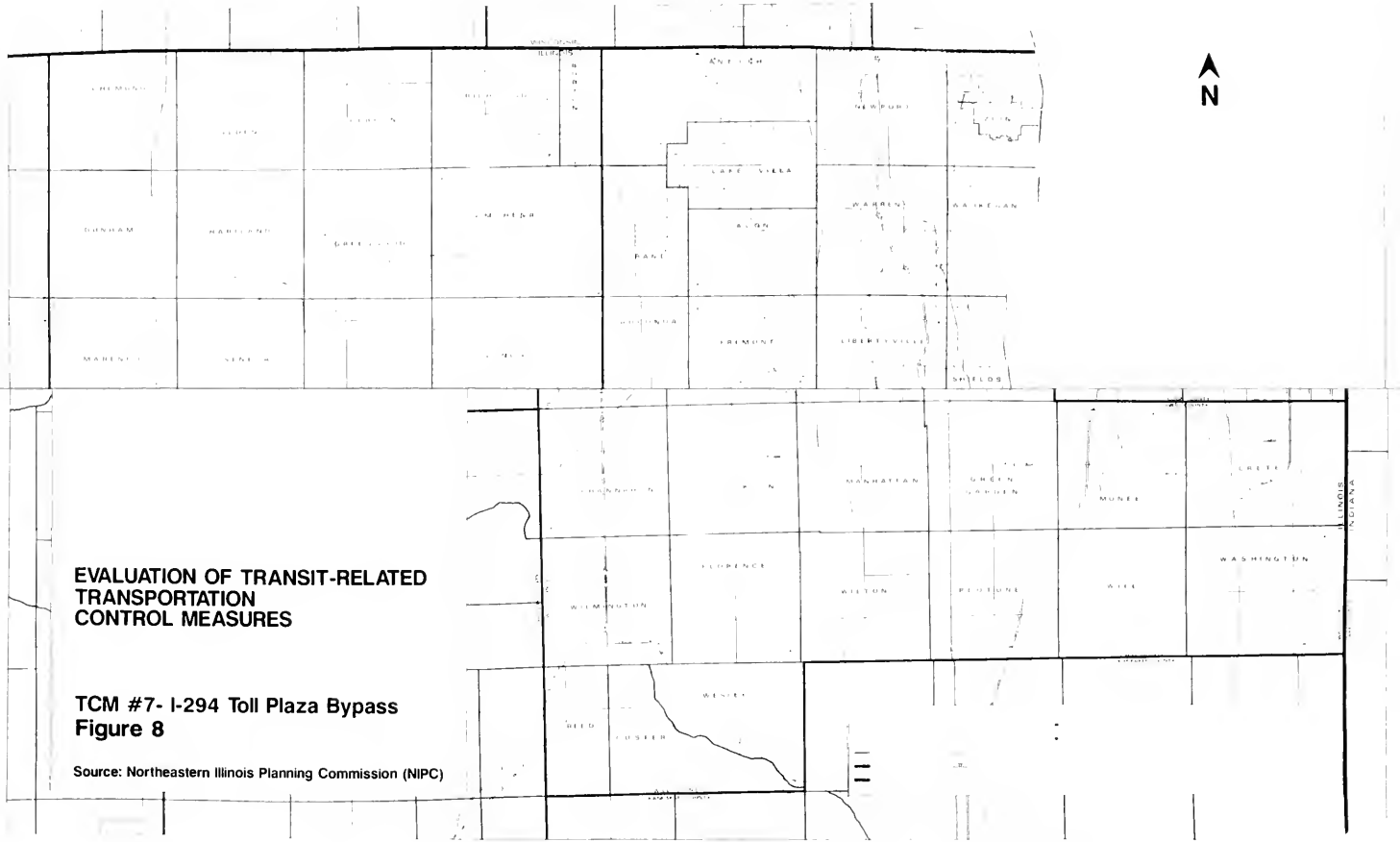
| | | |
|---|---|---|
| 1990 | VOCs | 0.000 |
| | CO | 0.003 |
| | NOx | 0.000 |

| TRIP SUMMARY - A.M. PEAK HOUR | | | | |
|---|---|---|---|---|
| | Trip Type | | | |
| Trip Purpose | Base Auto Trips | Base Transit Trips | Revised Auto Trips | Revised Transit Trips |
| **1990** | | | | |
| Work-CBD | 0 | 0 | 0 | 0 |
| Work-NonCBD | 7 | 0 | 0 | 7 |
| Nonwork | 0 | 0 | 0 | 0 |

Comments

Impacts peak hour trips only. Potential to eliminate auto trips plus reduce travel times as a result of decreases in bus running times. May decrease total travel time by 20 to 25 percent.

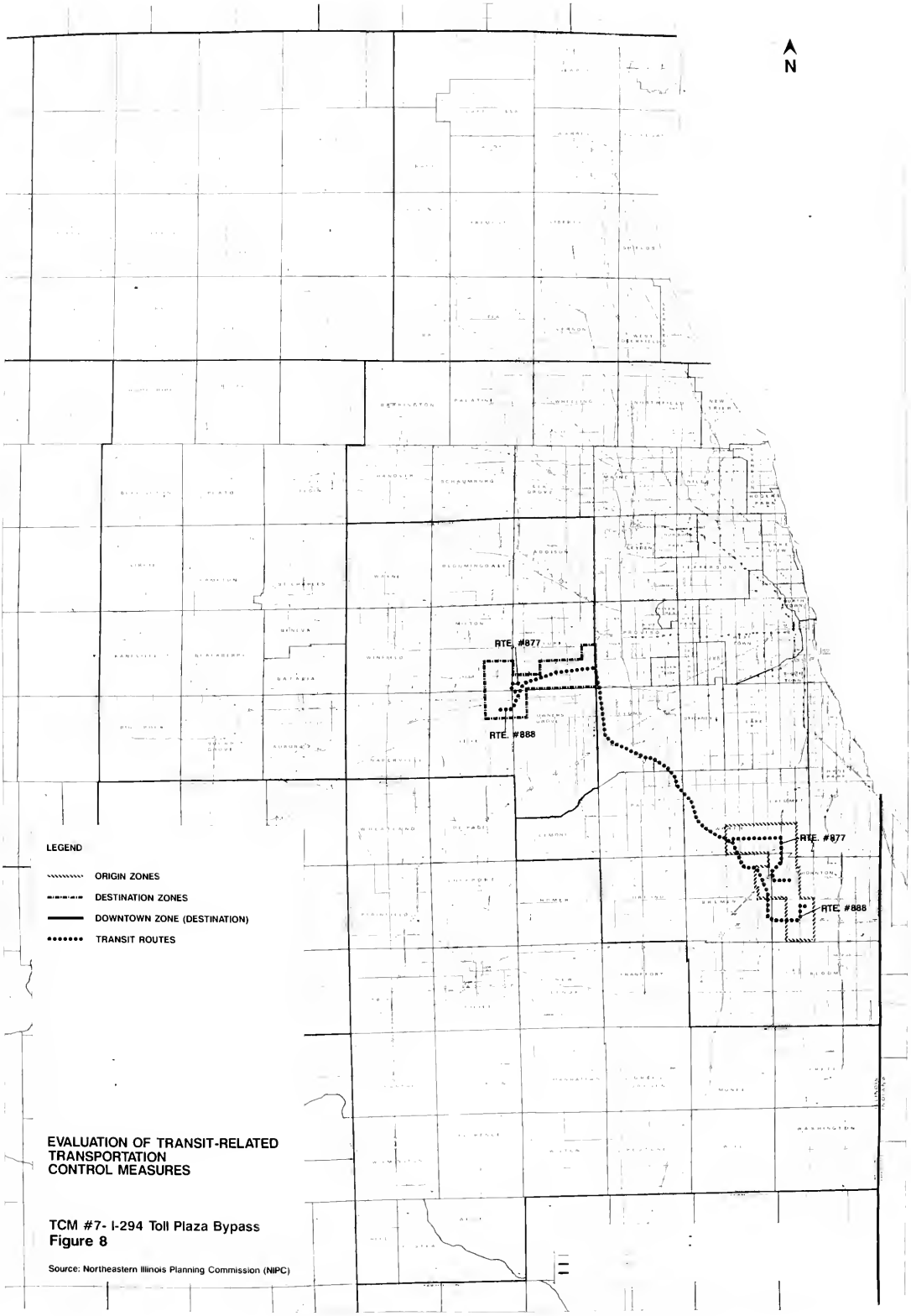
This TCM is being constrained by the regional travel model, which assigned few trips between the affected zones in the base year and none in the future. The above results are based on the travel in the regional forecast. This service currently carries about 350 daily riders, of which the average is about 20 riders per run on the 14 runs per day currently provided.




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #7- I-294 Toll Plaza Bypass**
**Figure 8**

Source: Northeastern Illinois Planning Commission (NIPC)




EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES

TCM #7- I-294 Toll Plaza Bypass
**Figure 8**

Source: Northeastern Illinois Planning Commission (NIPC)

Transportation Control Measure

#8: CTA Route 3, King Dr. Bus Service Management System (Automatic Vehicle Location, AVL, and Bus Signal Preemption).

Primary Travel Markets Impacted

All trips.

Area of Impact

Origin: One mile south of 95th St.; 2.5 miles east & west of King Drive from 95th St. to Roosevelt Rd.

Destination: One mile on each side of bus route between 95th St. to Chicago Ave.

Travel Time and Cost Impacts

Reduced In-Vehicle Time: (-3) seconds per signalized intersection.

Reduced Out-of-Vehicle (Transfer) Time: (-3) to (-5) minutes bus to bus transfer time.

Results

Number of Origin Zones 60

Number of Destination Zones:

| | |
|---|---|
| CBD | 6 |
| NonCBD | 10 |
| Nonwork | 16 |

Total Zonal Interchanges for Change in VMT Calculations:

| | |
|---|---|
| CBD | 360 |
| NonCBD | 600 |
| Nonwork | 960 |

Changes in A.M. Peak Hour VMT:

| | | | |
|---|---|---|---|
| 1990 | Work CBD | 0 | |
| | Work NonCBD | -1 | |
| | Nonwork | 0 | |
| 2010 | Work CBD | 0 | This number has been rounded from -0.000001. |
| | Work NonCBD | -2 | |
| | Nonwork | -0.233 | |

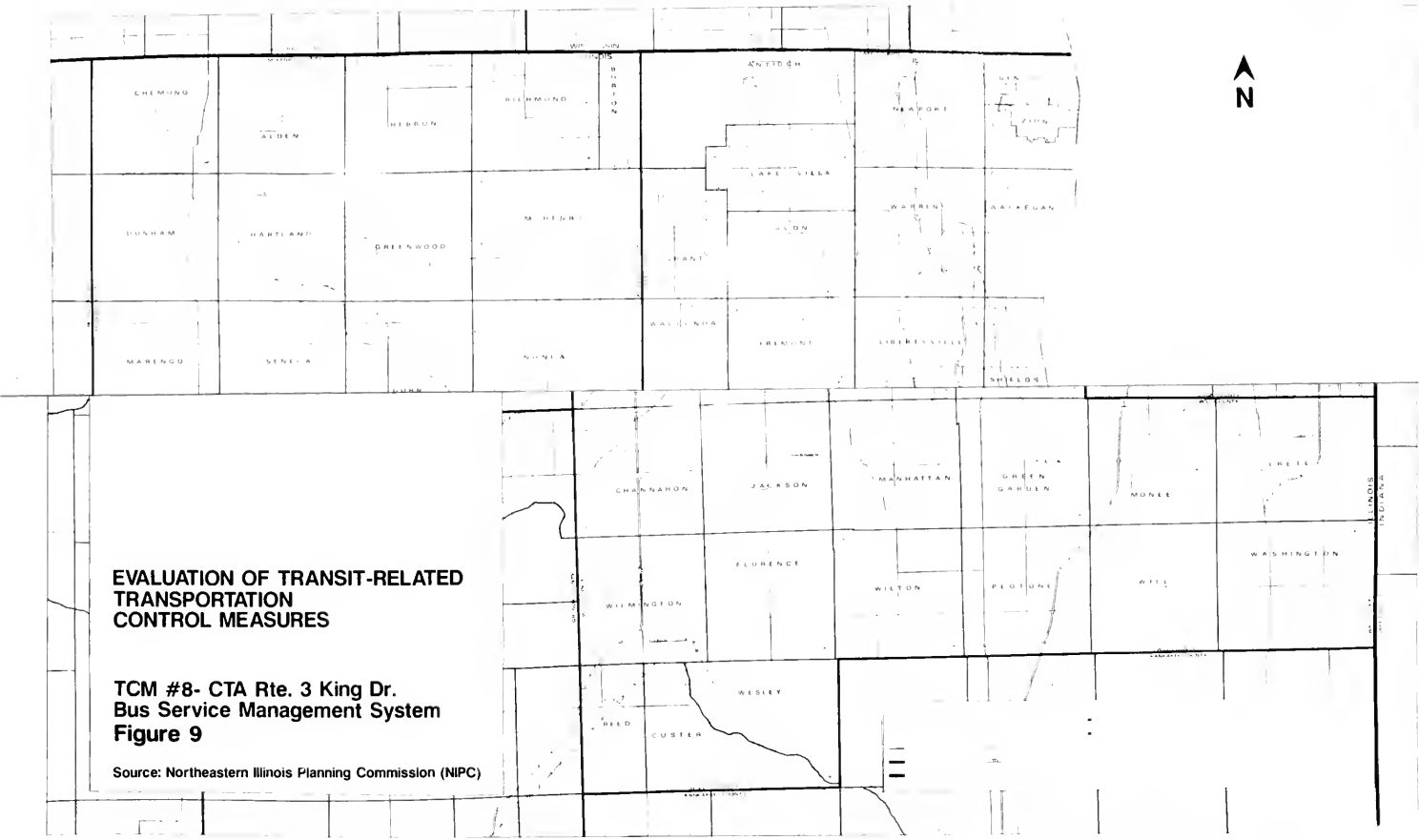
Changes in Emissions (Tons per day):

| | | |
|---|---|---|
| 1990 | VOCs | 0.000 |
| | CO | 0.000 |
| | NOx | 0.000 |
| 2010 | VOCs | -0.000 |
| | CO | -0.000 |
| | NOx | 0.000 |

| TRIP SUMMARY - A.M. PEAK HOUR | | | | |
|---|---|---|---|---|
| | Trip Type | | | |
| Trip Purpose | Base Auto Trips | Base Transit Trips | Revised Auto Trips | Revised Transit Trips |
| **1990** | | | | |
| Work-CBD | 9,860 | 27,978 | 9,860 | 29,978 |
| Work-NonCBD | 2,586 | 1,817 | 2,586 | 1,817 |
| Nonwork | 1,565 | 2,593 | 1,565 | 2,593 |
| **2010** | | | | |
| Work-CBD | 10,442 | 28,695 | 10,442 | 28,695 |
| Work-NonCBD | 3,502 | 2,746 | 3,501 | 2,747 |
| Nonwork | 1,322 | 3,664 | 1,322 | 3,664 |

Comments

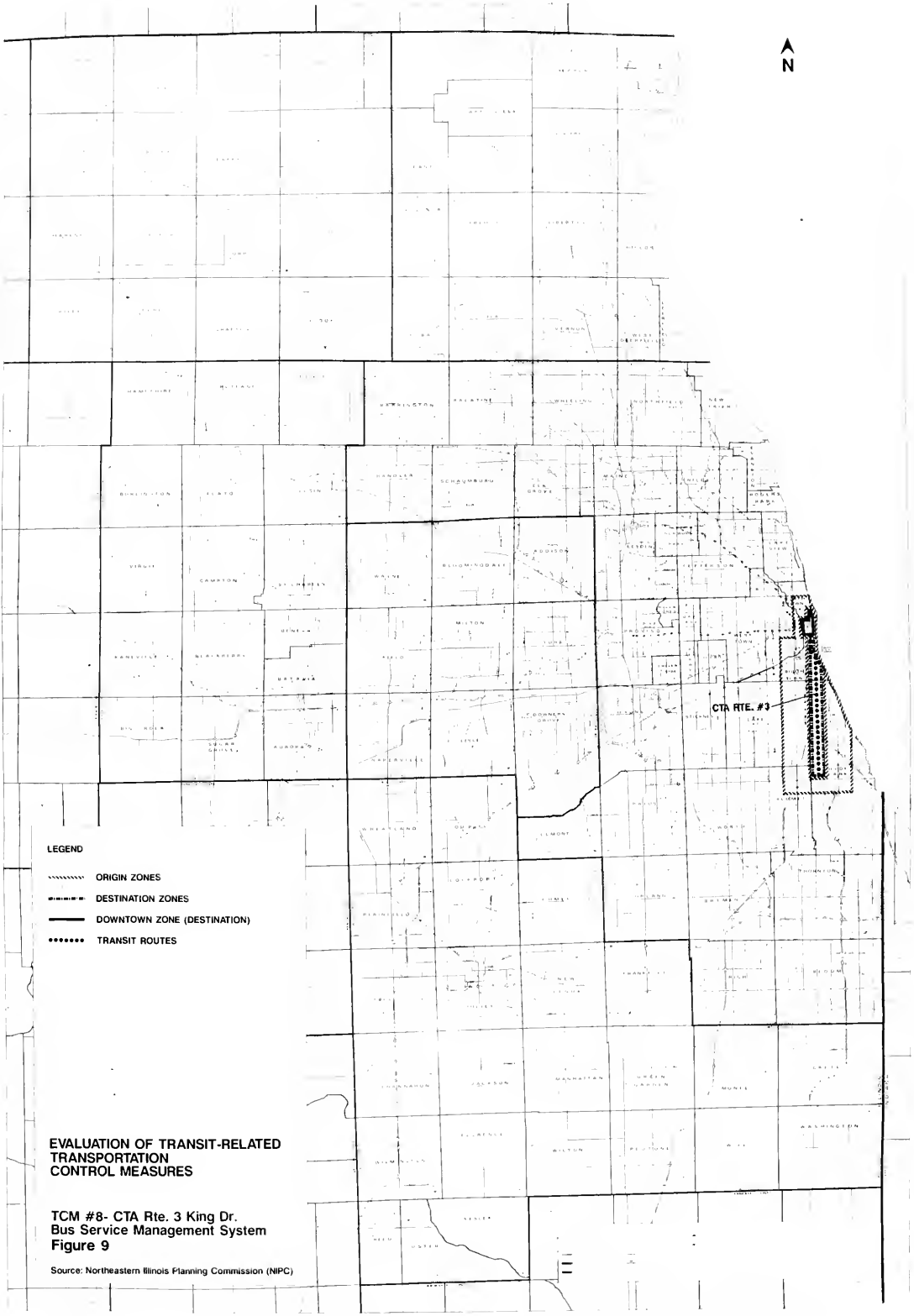
Impacts peak and nonpeak trips. Potential to eliminate auto trips plus reduce transit travel times. Increases service reliability and schedule adherence. May decrease total travel time by 5 to 10 percent.




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #8- CTA Rte. 3 King Dr. Bus Service Management System**
**Figure 9**

Source: Northeastern Illinois Planning Commission (NIPC)




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #8- CTA Rte. 3 King Dr. Bus Service Management System**
**Figure 9**

Source: Northeastern Illinois Planning Commission (NIPC)

Transportation Control Measure

#9: Pace Subscription Bus Service from southwest Chicago to Sears in Hoffman Estates.

Primary Travel Markets Impacted

NonCBD work trips.

Area of Impact

Origin: Four square mile zone around subscription bus pickup points.

Destination: Sears in Hoffman Estates.

Travel Time and Cost Impacts

Not calculated by incremental logit process; used empirical calculation of number of subscription bus routes multiplied by 30 riders per bus.

Results

Changes in Emission (Tons per day):

| | | |
|---|---|---|
| 1990 | VOCs | -0.164 |
| | CO | -0.896 |
| | NOx | -0.152 |

Trip Summary

Would convert 303 auto trips to transit trips.

Comments

Peak-period impact only. Would convert long-distance auto commute trips to short-distance auto trips to pickup points; would have similar cold-start characteristics to park-n-ride lot projects; could eliminate auto trips based on proximity to pickup point; would add bus VMT in place of auto VMT (included in above calculation).

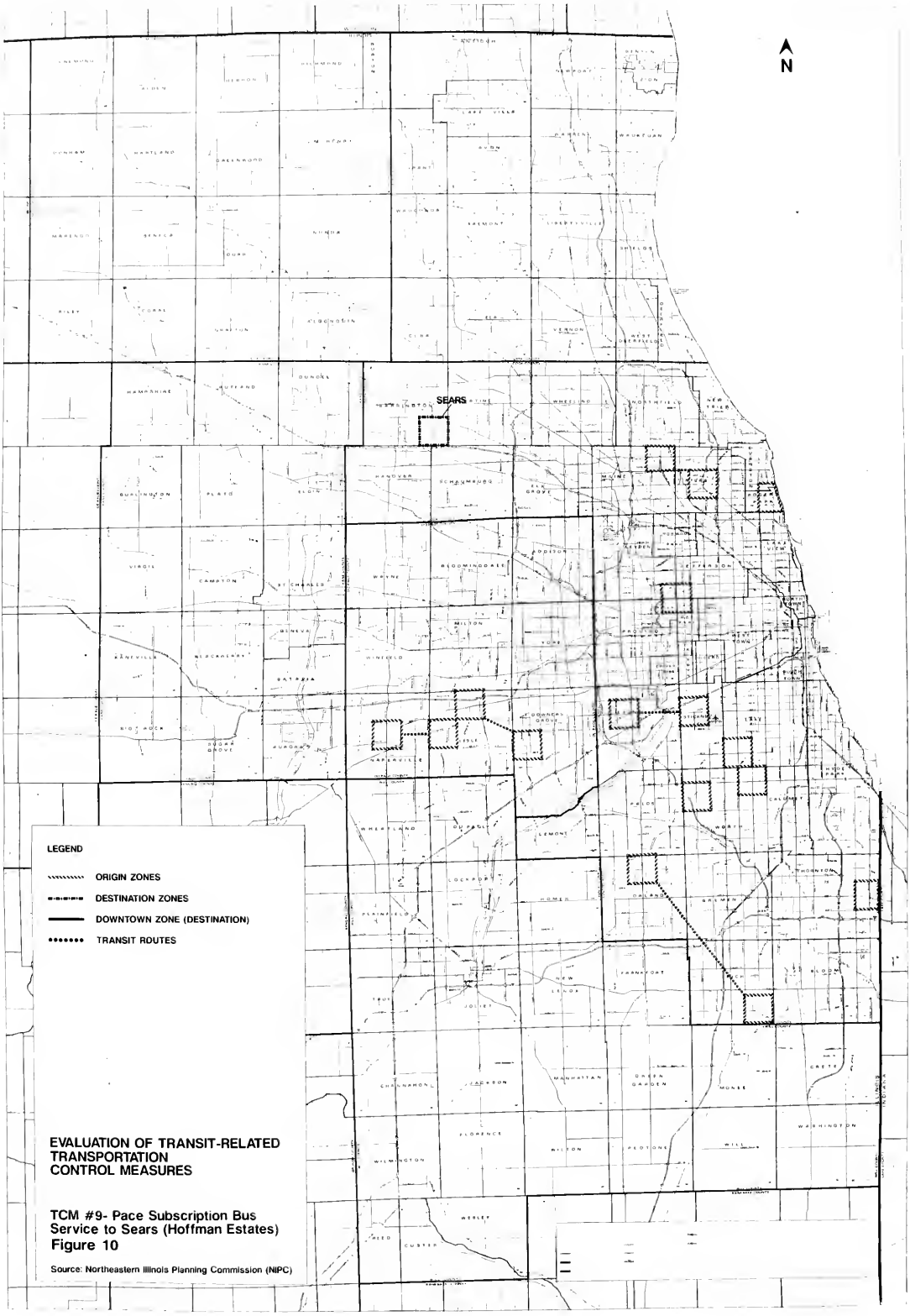
Air quality benefit is based on an assumption about mode switching that may be hard to rationalize. All trips are assumed to have been previously made by single-occupant vehicles. Therefore, the subscription bus is assumed to remove all of these trips, resulting in an equivalent air quality benefit.


**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #9- Pace Subscription Bus Service to Sears (Hoffman Estates)**

**Figure 10**

Source: Northeastern Illinois Planning Commission (NIPC)




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #9- Pace Subscription Bus Service to Sears (Hoffman Estates)**
**Figure 10**

Source: Northeastern Illinois Planning Commission (NIPC)

Transportation Control Measure

#10: Pace Subscription Vanpool Service from southwest Chicago to Sears in Hoffman Estates.

Primary Travel Markets Impacted

NonCBD work trips.

Area of Impact

Origin: Four square mile zone around vanpool pickup points.

Destination: Sears in Hoffman Estates.

Travel Time and Cost Impacts

Not calculated by incremental logit process; used empirical calculation of number of vanpools multiplied by 12 riders per van.

Results

Changes in Emission (Tons per day):

| | | |
|---|---|---|
| 1990 | VOCs | -0.092 |
| | CO | -0.500 |
| | NOx | -0.840 |

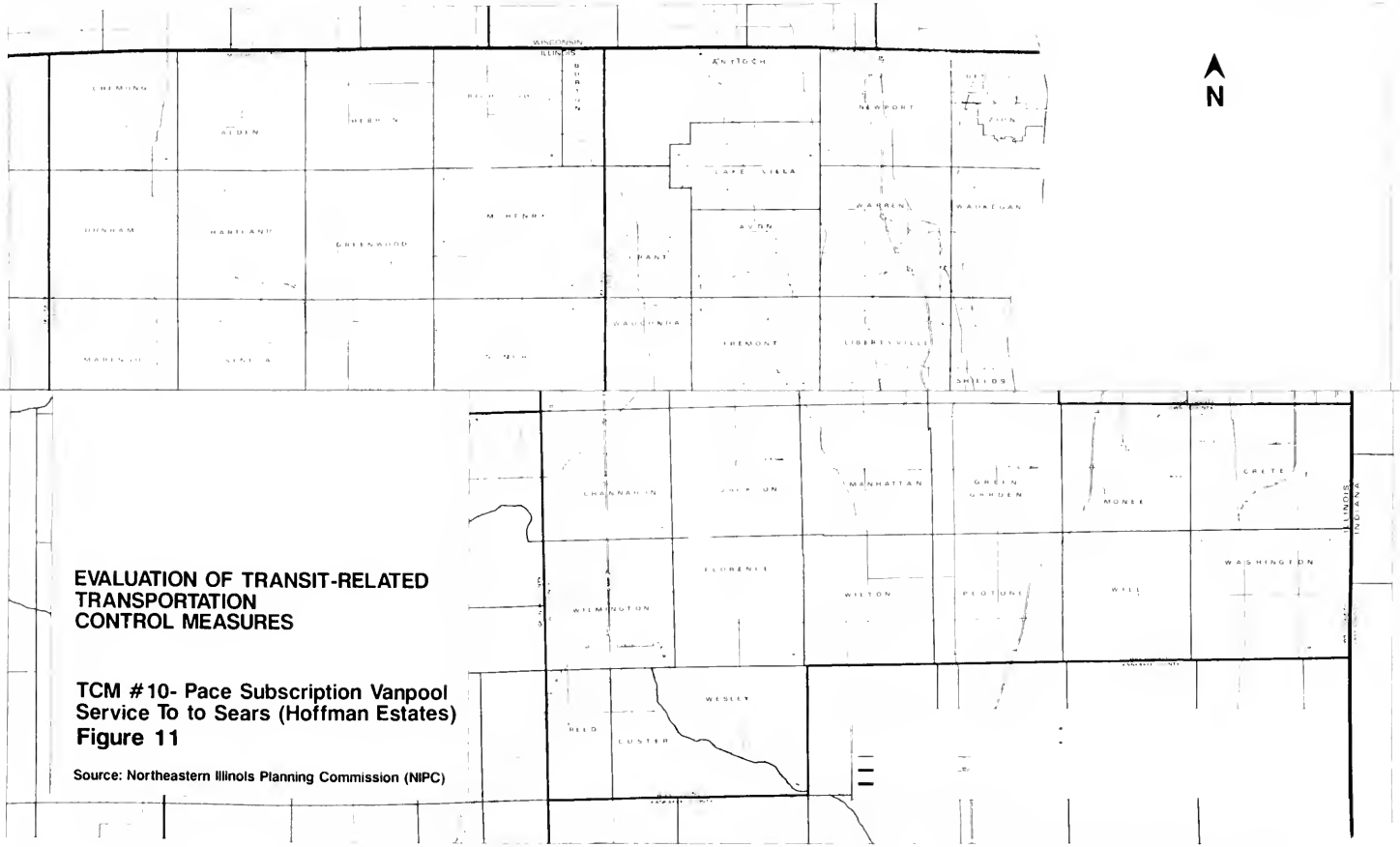
Trip Summary

Would convert 224 auto trips to transit trips.

Comments

Peak-period impact only. Would convert long-distance auto commute trips to short-distance auto trips to pickup points; would have similar cold-start characteristics to park-n-ride lot projects; could eliminate auto trips based on proximity to pickup point (e.g., if van made house pickups rather than park-n-ride facility); would add van VMT in place of auto VMT (included in above calculation).

Air quality benefit is based on an assumption about mode switching that may be hard to rationalize. All trips are assumed to have been previously made by single-occupant vehicle. Therefore, the subscription vanpool is assumed to remove all of these trips, resulting in an equivalent air quality benefit.

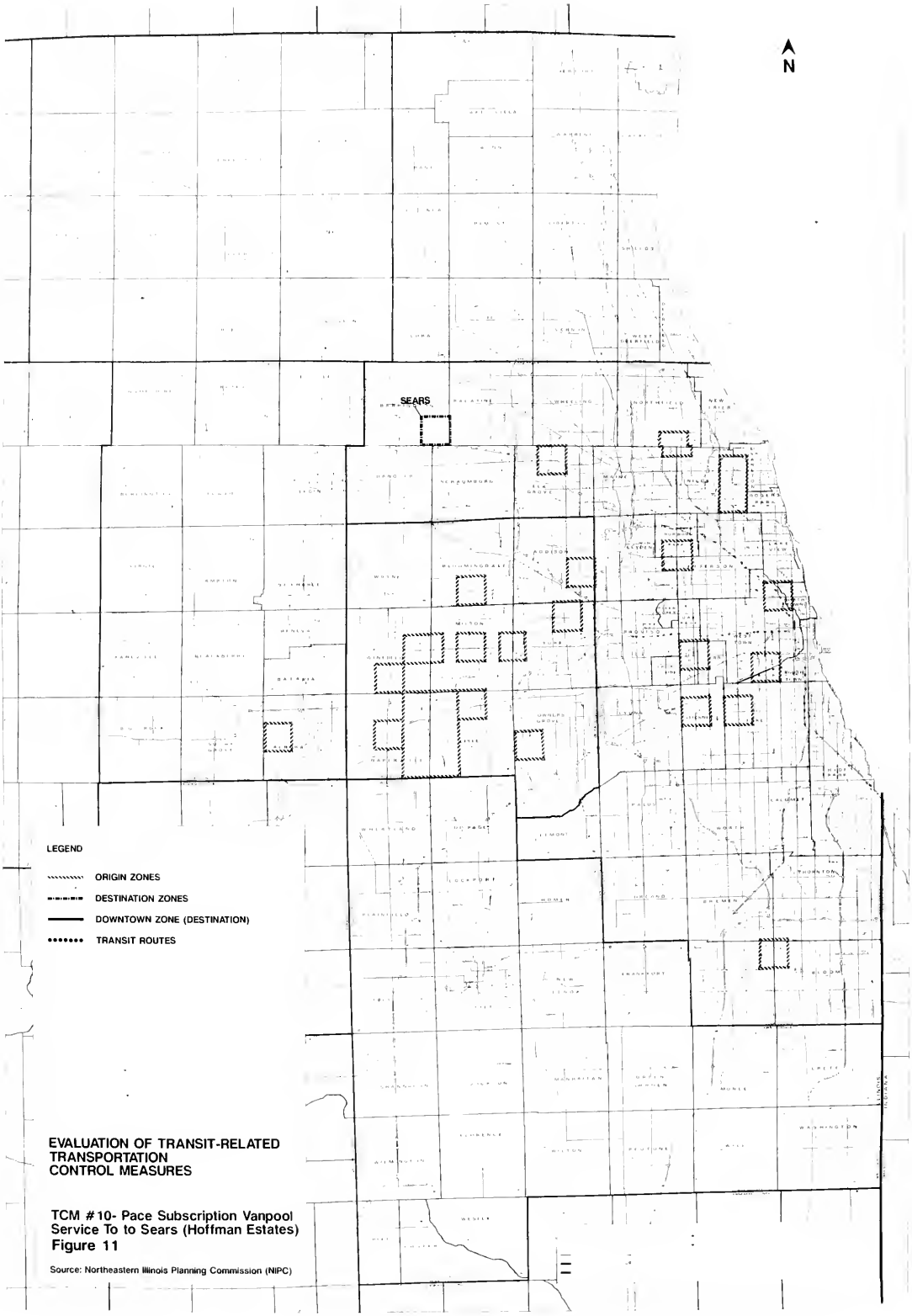



**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #10- Pace Subscription Vanpool Service To to Sears (Hoffman Estates)**

**Figure 11**

Source: Northeastern Illinois Planning Commission (NIPC)




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #10- Pace Subscription Vanpool Service To to Sears (Hoffman Estates)**
**Figure 11**

Source: Northeastern Illinois Planning Commission (NIPC)

Transportation Control Measure

#11: RTA Transit Fare Subsidy.

Primary Travel Markets Impacted

All trips.

Area of Impact

Origin: Total region.

Destination: Total region.

Travel Time and Cost Impacts

Reduced Cost: -$0.20 cost savings per trip (1990$).

Results

Number of Origin Zones 1,600

Number of Destination Zones:

| | |
|---|---|
| CBD | 12 |
| NonCBD | 1,588 |
| Nonwork | 1,600 |

Total Zonal Interchanges for Change in VMT Calculations (based on all transit users receiving transit fare subsidy):

| | |
|---|---|
| CBD | 19,200 |
| NonCBD | 2,540,800 |
| Nonwork | 2,560,000 |

Changes in A.M. Peak Hour VMT (adjusted to reflect percentage of employees using transit fare subsidy in relation to total regional employment):

| | | |
|---|---|---|
| 1990 | Work CBD | - 81 |
| | Work NonCBD | -109 |
| | Nonwork | - 54 |
| 2010 | Work CBD | - 94 |
| | Work NonCBD | - 98 |
| | Nonwork | - 49 |

Changes in Emissions (Tons per day) (adjusted to reflect percentage of employees using transit fare subsidy in relation to total regional employment):

| | | |
|---|---|---|
| 1990 | VOCs | -0.004 |
| | CO | -0.026 |
| | NOx | -0.003 |
| 2010 | VOCs | -0.001 |
| | CO | -0.009 |
| | NOx | -0.002 |

| TRIP SUMMARY - A.M. PEAK HOUR | | | | |
|---|---|---|---|---|
| | Trip Type | | | |
| Trip Purpose | Base Auto Trips | Base Transit Trips | Revised Auto Trips | Revised Transit Trips |
| **1990** | | | | |
| Work-CBD | 46,418 | 139,351 | 41,315 | 144,454 |
| Work-NonCBD | 689,060 | 115,993 | 680,144 | 124,909 |
| Nonwork | 235,138 | 39,661 | 229,282 | 45,517 |
| **2010** | | | | |
| Work-CBD | 53,842 | 167,560 | 47,853 | 173,549 |
| Work-NonCBD | 820,912 | 122,198 | 812,242 | 130,868 |
| Nonwork | 245,686 | 41,975 | 240,281 | 47,380 |

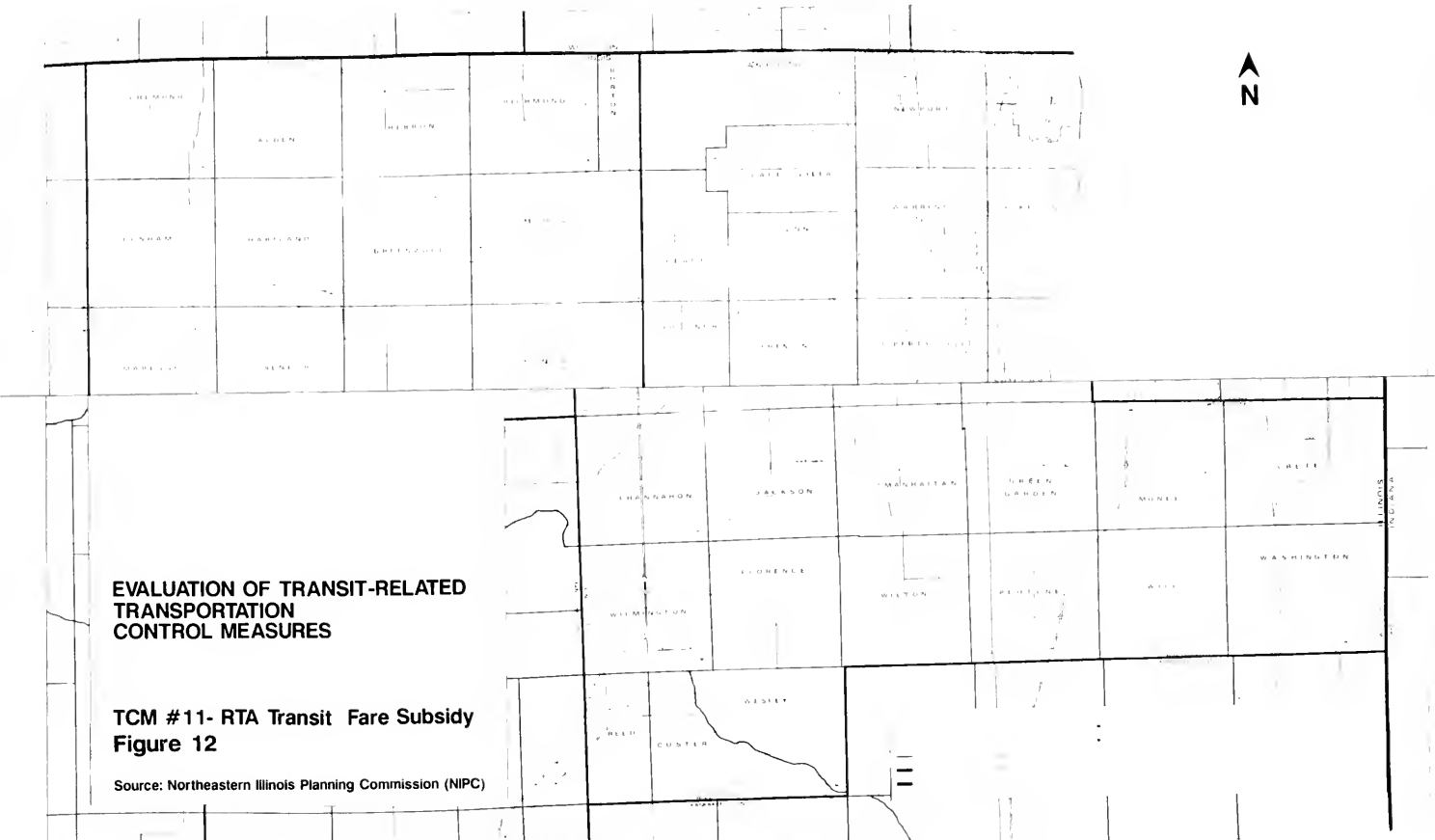
Comments

The transit fare subsidy reduces the cost of transit in relation to auto travel, resulting in auto trip reductions. Changes in transit share were calculated based on two assumptions:

1. Fare subsidy is available to all transit users.

2. $21.00 fare subsidy used by all.

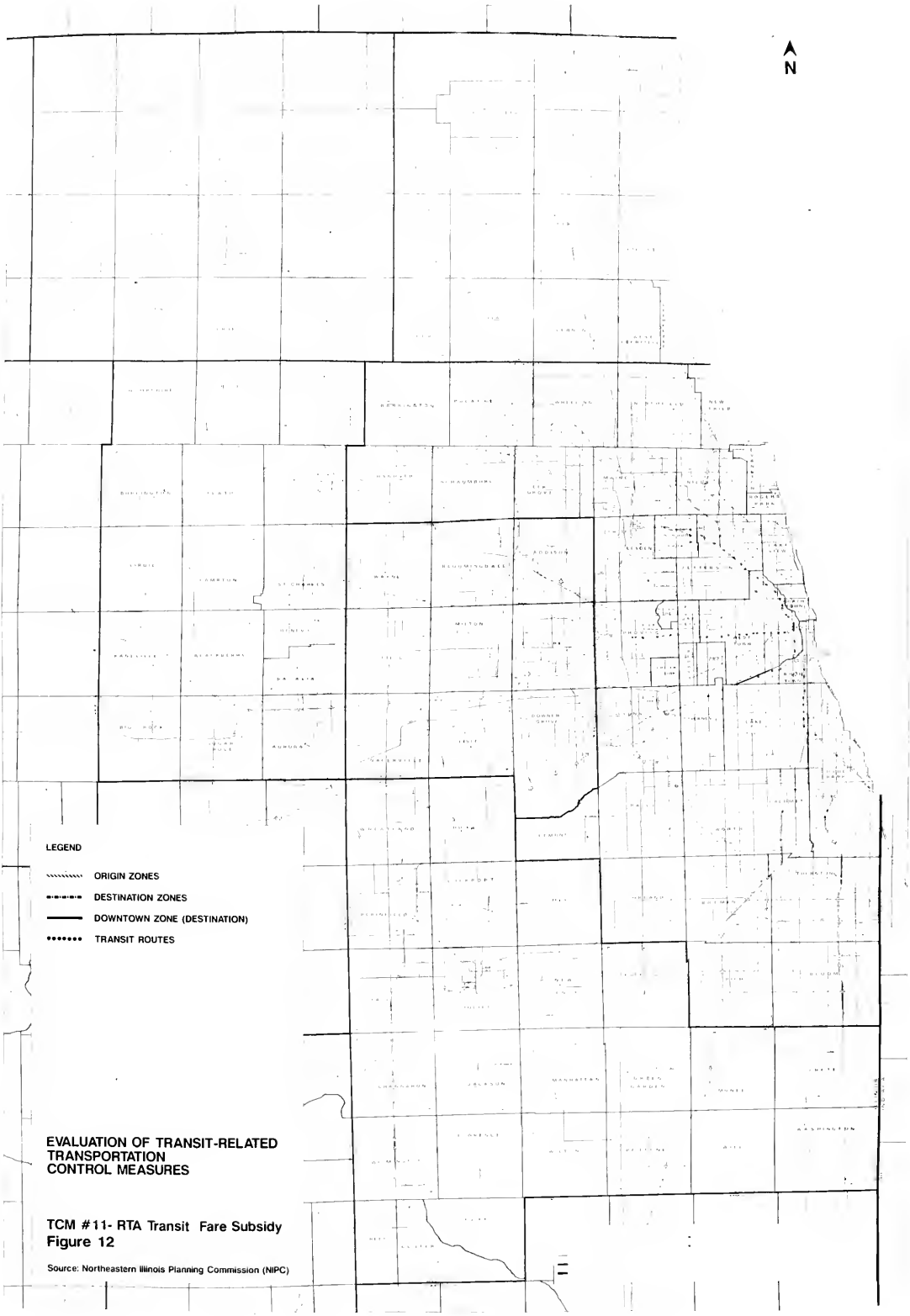
Because the fare subsidy is administered by employers, not all transit users have access to the fare subsidy. Accordingly, the changes in VMT were factored to represent the existing level of transit fare subsidy use. The factor is the ratio of the total number of transit pass users in relation to total regionwide employment for both 1990 (3,834,898) and 2010 (4,170,846).




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #11- RTA Transit Fare Subsidy**
**Figure 12**

Source: Northeastern Illinois Planning Commission (NIPC)




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #11- RTA Transit Fare Subsidy**
**Figure 12**

Source: Northeastern Illinois Planning Commission (NIPC)

Transportation Control Measure

#12: Metra-Franklin Park station grade separation.

Primary Travel Markets Impacted

CBD and nonCBD work trips.

Area of Impact

Origin: Four square mile zone around Franklin Park station.

Destination: Zones along Metra line between end of line and downtown Chicago, excluding Franklin Park.

Travel Time and Cost Impacts

Reduced Access Time: -(5) minutes based on current delay.

Results

Number of Origin Zones 4

Number of Destination Zones:

| | |
|---|---|
| CBD | 12 |
| NonCBD | 46 |
| Nonwork | 58 |

Total Zonal Interchanges for Change in VMT Calculations:

| | |
|---|---|
| CBD | 48 |
| NonCBD | 184 |
| Nonwork | 232 |

Changes in A.M. Peak Hour VMT:

| | | |
|---|---|---|
| 1990 | Work CBD | -96 |
| | Work NonCBD | -1 |
| | Nonwork | 0 |
| 2010 | Work CBD | -113 |
| | Work NonCBD | -1 |
| | Nonwork | 0 |

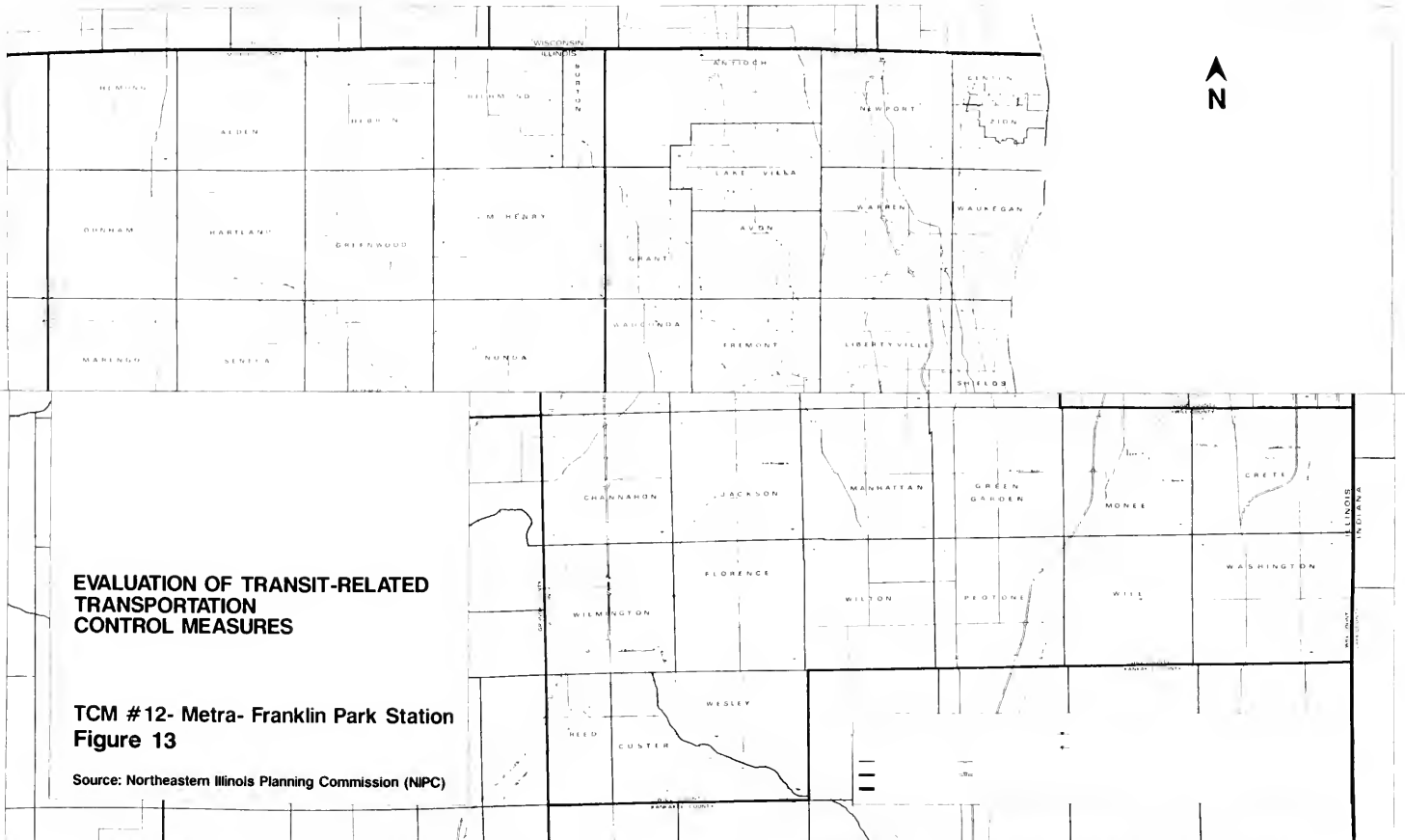
Changes in Emissions (Tons per day):

| | | |
|---|---|---|
| 1990 | VOCs | 0.000 |
| | CO | -0.008 |
| | NOx | 0.000 |
| 2010 | VOCs | 0.000 |
| | CO | -0.004 |
| | NOx | 0.000 |

| TRIP SUMMARY - A.M. PEAK HOUR | | | | |
|---|---|---|---|---|
| | Trip Type | | | |
| Trip Purpose | Base Auto Trips | Base Transit Trips | Revised Auto Trips | Revised Transit Trips |
| **1990** | | | | |
| Work-CBD | 35 | 175 | 29 | 181 |
| Work-NonCBD | 374 | 2 | 374 | 2 |
| Nonwork | 162 | 0 | 162 | 0 |
| **2010** | | | | |
| Work-CBD | 39 | 247 | 32 | 254 |
| Work-NonCBD | 311 | 2 | 310 | 3 |
| Nonwork | 111 | 0 | 111 | 0 |

Comments

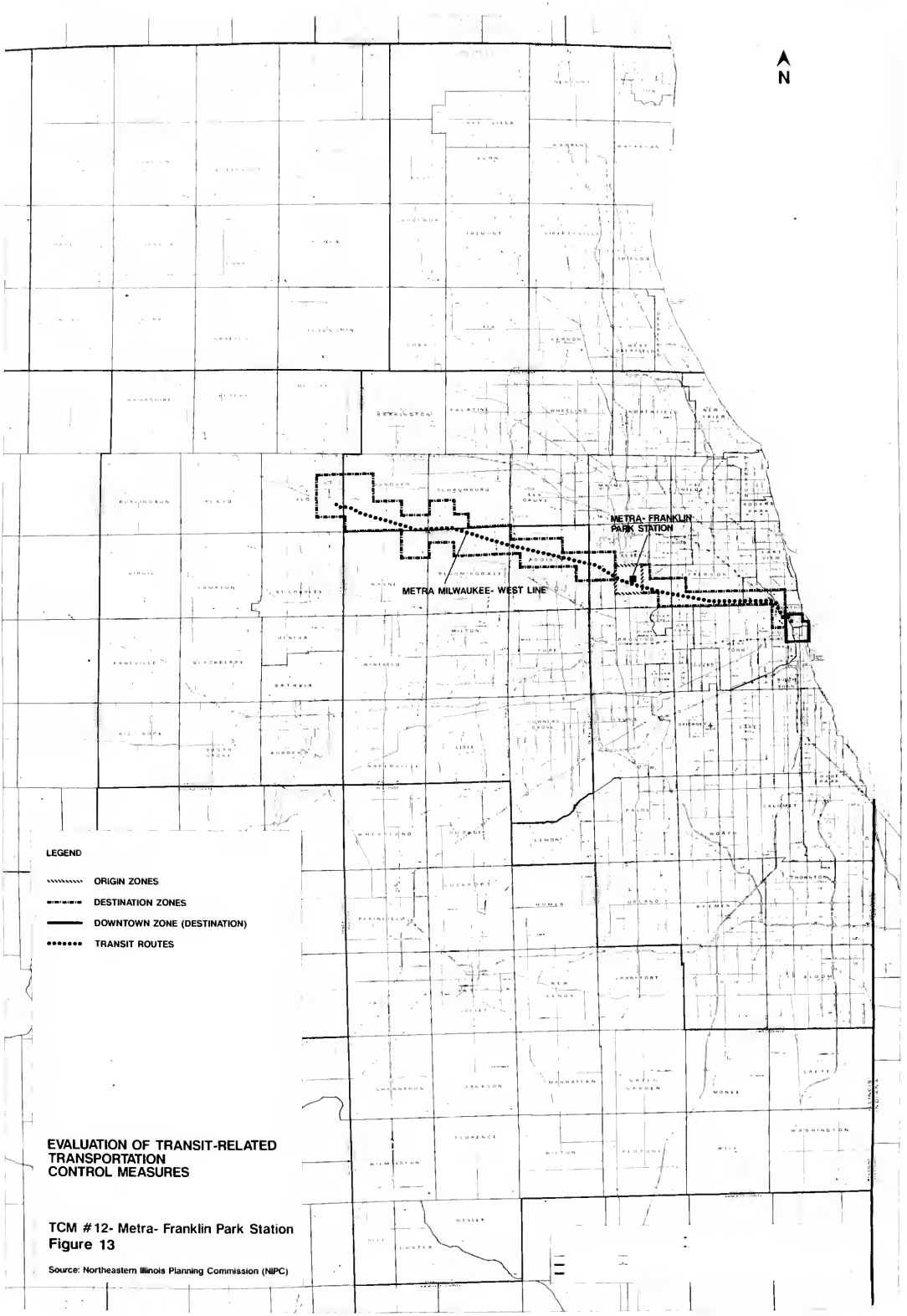
Impacts peak period travel, when most delay occurs. Results in improved traffic flow and increased travel speeds. Increased speeds result in emission reductions. However, may also increase attractiveness of auto mode in relation to transit, causing mode switch to auto and induced travel. May reduce total travel time by approximately 5 to 10 percent.




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #12- Metra- Franklin Park Station**
**Figure 13**

**Source: Northeastern Illinois Planning Commission (NIPC)**




**EVALUATION OF TRANSIT-RELATED TRANSPORTATION CONTROL MEASURES**

**TCM #12- Metra- Franklin Park Station**
**Figure 13**

Source: Northeastern Illinois Planning Commission (NIPC)

# 6.
# Conclusions

As the screening methodology was developed and alternative TCM projects were analyzed, issues were raised concerning several areas: general limitations of the process employed, the overall effectiveness of different types of transit projects, and modeling enhancements/refinements to generate better estimates of VMT and emissions changes.

## 6.1 Limitations of Evaluation Process

The methodology was developed for this project as a screening tool to be used at the regional level. In addition, the methodology employed was designed to estimate results consistent with the regional travel models, but without rerunning the regional models. Based on these, there are inherent limitations in the process. Some of these limitations may be overcome by rerunning the regional models, conducting sensitivity analyses, or supplementing survey data for the regional travel data. It is important to identify and take into consideration these limitations listed below when the results are interpreted and conclusions made about the impact of specific TCMs.

- The evaluation process only works for areas with existing transit service. Areas without transit service will not have any transit trips in the regional model. Because of this, results are better for line-haul service to the downtown, as the travel data is more complete. For new transit markets, TCM impacts must be calculated manually, rerun on the regional model, or regional travel data must be supplemented with survey data.
- Regional travel models are not designed for an analysis generating this level of detail, such as off-peak travel and nonwork trips.
- The speed data from the regional model has limitations. Speed data tends not to be as accurate as volume data, so most models are calibrated to volumes, not speeds. This is because speeds are more variable and therefore more difficult to calibrate.

- Secondary impacts are difficult to determine, as this process does not distinguish between eliminating trips completely and reducing trip lengths. The output of this process is the change in VMT, which is composed of both trips eliminated and trips shortened.
- This process only predicts the impact of a single TCM, not TCMs implemented together. Some TCMs are synergistic, while others are conflicting. Some TCMs may be additive because they affect different transit markets and the benefits of several TCMs may be added together. Other TCMs affect the same transit market and commuters will choose one TCM over another, so benefits cannot be added together.

These limitations should be evaluated for those changes that are desired and/or additional research should be conducted. More current data should be available as the model is updated with the 1990 census journey-to-work data and as other model changes are made in response to U.S. EPA requirements.

## 6.2 Effectiveness of Transit Projects

Each TCM was evaluated based on its relative effectiveness in reducing VMT and pollutant emissions. From the results of this evaluation, it becomes clearer what types of projects generate the greatest reductions. Those projects that involve changes in cost show the most sensitivity. The Wood Dale Metra station distributor bus had a higher cost and resulted in the least impact on VMT and emissions. The RTA Transit Fare Subsidy was evaluated based on availability to all transit users (regardless of employer participation) and then factored to reflect existing use of the subsidy. Even with a relatively small proportion of existing transit fare subsidy users in relation to total employment, reductions in emissions were generated.

It is important to identify the relative impact of each TCM on cost and travel time. The transit fare subsidy of $21.00 may represent 30 percent of a transit user's total cost, whereas a 3- to 5-minute change in travel time savings may represent only 5 to 10 percent of total travel time. Therefore, a sensitivity analysis may be warranted to identify what changes would be needed to generate travel time savings of a comparable percentage and how this would change VMT and emissions.

In addition to identifying those projects with the least and greatest impacts, it is also important to distinguish between those projects that reduce VMT and those that eliminate trips. Projects including park-n-ride lots, such as rapid transit/commuter rail stations, vanpool services, or subscription bus services, may reduce VMT but still generate auto trips to and from the park-n-ride or pickup/drop-off locations. These projects will still generate significant emissions by vehicles driven in the cold start mode.

Additional comparisons recommended for future analysis of TCMs include cost-effectiveness, the use of sensitivity analysis, and combinations of TCMs. An evaluation should be conducted of the cost-effectiveness of each TCM based on the cost per ton of emissions reduced compared to the cost of the TCM. The cost-effectiveness should be compared for all TCMs to identify those TCMs that reduce the greatest amount of emissions for the least cost.

## 6.3 Future Model Enhancements

The results presented in Chapter 5 show the impact of each TCM on emissions and VMT to the extent that the TCMs can be analyzed with the regional travel forecast model systems. Throughout this study, however, enhancements and/or refinements to the regional modeling process were identified. These enhancements/refinements were grouped into two categories: those applicable to existing TCMs that affect transit services, and those applicable to new transit services and employer programs.

### 6.3.1 Existing Services and Facilities

If the existing transit service has been coded into the regional travel forecasting model, then TCMs affecting this service can generally be easily analyzed using the incremental logit and elasticity approaches based on these models. As has been done in this study, each TCM can be represented by changing travel times on existing links, headways for existing transit lines, and/or fares for limited subsets of origin/destination pairs.

In several instances, as noted above, the regional model did not include transit trips where transit services currently exist. Similarly, the regional model is currently calibrated primarily for work-related travel. Because nonwork trips are based on home interview data, they are only as accurate as the most recent update of this data. In a region that has experienced change like that in the Chicago metropolitan area, it may be necessary to update the model calibration process on a more frequent basis so that the regional forecasts more closely mirror the changes in travel patterns.

The primary enhancements to the modeling process to support TCM evaluation are twofold. Iterative validation of base year data to adequately represent known transit trips is one step that could resolve some of the inconsistencies found during this study. The second step is to update trip behavior data so that work and nonwork patterns can be more accurately represented in the modeling process.

Sensitivity analyses should be used to test adjustments to TCMs, such as different fare structures, increased speeds, or improvements over larger areas. The initial run would be the baseline against which to compare a sensitivity test. This may be a time-consuming process, as multiple runs will be required, but the benefit would be a greater understanding of what types of adjustments generate greater reductions in emissions. A sensitivity test also could be used to determine the amount of VMT to be reduced to offset cold starts.

### 6.3.2 New Transit Services

The existing regional and sketch planning models also can be used to analyze many new transit services, but not as easily or completely as for existing transit services. If the regional models are used, new links, transit lines, transfer facilities, and possibly fare matrices should be coded to provide the basis for determining changes in in-vehicle times, out-of-vehicle times, and travel

costs for transit trips. Sketch planning methods will be applicable on a more limited basis. If transit use from the new service area is not currently significant, then there will be no basis to "pivot" to estimates of new higher patronage levels. Furthermore, the existing regional models may not provide the features required to address some aspects of these strategies.

Existing regional models provide the needed analysis methods for evaluating new transfer facilities and new routes, but may need to be refined or supplemented for dial-a-ride, subscription bus, and park-n-ride projects, or employer-based programs such as carpool, vanpool, and transit fare subsidies. Model enhancements for these projects are described below.

1. *New Commuter Rail Stations and/or Park-n-Ride Lots; Expanded Park-n-Ride Lots.* In most cases, these facility changes will have no impact on the inputs to the regional models; thus, their impacts on transit patronage cannot be estimated by these models. If it is assumed that the regional models overestimate park-n-ride demand because they do not take parking capacity limitations into account, then the regional models could be extended to provide realistic estimates of park-n-ride facility usage. This can be done by checking the model results to determine if capacity constraints are exceeded. Ideally, the revision process requires "shadow" parking lot prices applied iteratively until parking demand equals supply, but sketch planning approximations can be used to adjust the changes in emissions to be consistent with the available capacity. The regional models are also likely to require extension to ensure that the emissions of autos used for park-n-ride and kiss-n-ride are also measured. For detailed analysis of these emissions, changes in trip lengths and operating mode fractions will be necessary as inputs to the MOBILE5 emission factor model. For sketch planning analysis, in most cases it will be appropriate to assume that all of the available additional park-n-ride capacity will be used, due to existing deficits in capacity at the stations selected for parking expansion. Thus, the difference between the existing VMT for auto travelers in the area served by the expanded facility and their new VMT level if they use the park-n-ride facility can be attributed to each new parking space to estimate the impacts of the expanded facility on auto VMT.

2. *Park-n-Ride Lots with HOV Preferences.* Special procedures or approximations may be required to supplement the regional models if parking demand, by either general park-n-ride autos or HOVs, exceeds capacity. Similarly, the emissions of parkers must be measured. In addition, extended HOV analysis methods such as those included in the CATS model will be required to obtain both HOV and general auto access demand levels. Sketch planning methods will be applicable to these strategies.

3. *New Dial-a-Ride Services.* The flexible schedules and routes of dial-a-ride do not lend this strategy to analysis using the existing model systems or sketch planning approaches. Experience with similar systems elsewhere, preferably in the Chicago region, should be used to estimate the usage and VMT reduction characteristics of this strategy. The best sources of information on such systems at the national level are provided by the TDM analysis systems and extension of the traditional mode choice forecasting strategies.

4. *Subscription Bus Service.* If these services have a limited (i.e., restricted) set of qualified users, they cannot be handled accurately in the existing model system. However, if a person

trip table including only qualified users can be specified (as in the example of Sears employees in Hoffman Estates), then the existing mode choice model could be used as a sketch planning tool to predict trips by mode and VMT by origin/destination pair under alternative subscription bus service assumptions.

5. *Vanpools*. If a person-trip table including only qualified users can be specified (as in the example of Sears employees in Hoffman Estates), then existing mode choice models and HOV forecasting processes may be usable in a sketch planning procedure for predicting trips by mode and VMT by origin/destination pair under alternative vanpool service assumptions. In the more general case, single-employer analyses using information from comparable programs (TDM) will be required, possibly with expansions to zonal totals based on assumptions concerning the numbers of employers by size category, and the percentages of employers in each category likely to participate in vanpool programs.

6. *Transit Fare Subsidies*. Generally, single-employer analyses using information from comparable programs (TDM) will be required, possibly with expansion to zonal totals in the case of programs for which participation by many employers is likely, as discussed in Item 5.

**Table 5**

**EVALUATION OF TRANSIT–RELATED TRANSPORTATION CONTROL MEASURES**

**SUMMARY TABLE ON PROJECTS AND PRELIMINARY RESULTS**

| Transportation Control Measure | Travel Market Impact | Travel Time & Cost Impacts | Change in Emissions (Tons per day) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 1990 | | | 2010 | | |
| | | | VOCs | CO | NOx | VOCs | CO | NOx |
| West Chicago Metra Station Park–n–Ride Lot | CBD Work | –10 min. access time | –0.004 | –0.028 | –0.004 | –0.004 | –0.024 | –0.004 |
| Cumberland Ave. Park–n–Ride Lot CTA – O'Hare Line | CBD Work; NonCBD Work | –3 min. access time | –0.008 | –0.040 | –0.004 | 0.000 | –0.008 | 0.000 |
| 95th St. Station Redesign CTA – Dan Ryan Line | CBD Work; nonCBD work; Nonwork | –2 min. access time –3 min. transfer time | –0.012 | –0.068 | –0.008 | –0.004 | –0.024 | –0.004 |
| Schaumburg Transportation Center Woodfield Mall | NonCBD Work; Nonwork | –5 to –20 min. transfer time | 0.000 | –0.004 | 0.000 | 0.000 | –0.004 | 0.000 |
| Wood Dale Metra Station Distributor Bus | NonCBD Work | +$.85 fare; +2 min. transfer time; –5 min. in–vehicle time | 0.000 | 0.000 | 0.000 | 0.000 | –0.004 | 0.000 |
| Cermack Ave. Bus Signal Pre–emption | All Trips | –3 seconds per signalized intersection | 0.000 | –0.008 | 0.000 | 0.000 | –0.004 | 0.000 |
| I–294 Toll Plaza Bypass | NonCBD Work | –15 min. in–vehicle time | 0.000 | 0.003 | 0.000 | NA | NA | NA |
| CTA Rt. 3 King Dr. Bus Service Management System | All Trips | –3 seconds per signalized intersection; –3 to–5 min. transfer time | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Pace Subscription Bus Service to Sears, Hoffman Estates | NonCBD Work | Calculated manually | –0.164 | –0.896 | –0.152 | NA | NA | NA |
| Pace Subscription Vanpool Service to Sears, Hoffman Estates | NonCBD Work | Calculated manually | –0.092 | –0.500 | –0.840 | NA | NA | NA |
| RTA Transit Fare Subsidy | All Trips | –$.20 per trip | –0.004 | –0.026 | –0.003 | –0.001 | –0.009 | –0.002 |
| Franklin Park Metra Station Grade Separation | CBD Work; NonCBD Work | –5 min. access time | 0.000 | –0.008 | 0.000 | 0.000 | –0.004 | 0.000 |

Prepared by: Barton–Aschman Associates, Inc. 3/93

# Appendix A
# Profiles of Transportation Control Measures

## PROJECT PROFILE

1. TCM TYPE

2. PHYSICAL DESCRIPTION

3. LOCATION

4. SERVICE CHANGE (Change in bus or rail service)

5. TCM CAPACITY (Increase in space or usage)

6. RIDERSHIP
    a. Current
    b. Expected Change (+/-)

7. CONNECTING ROADWAY IMPACTS
    a. Capacity
    b. Usage
    c. Expected Change

8. POTENTIAL BENEFITS

9. POTENTIAL DEFICITS

10. COST

11. RELATIONSHIP TO ETR PLANS
    a. Direct
    b. Indirect

12. ISSUES/CONCERNS

## PROJECT PROFILE

1. TCM TYPE: Number 2, Transit Station Park-n-Ride lots

2. PHYSICAL DESCRIPTION: Increased parking capacity at parking facility with 750 spaces to 1500 spaces. Facility has reserved first floor, 350 spaces for HOV (car pools) and 25 spaces for Disabled. CATS has supplied staff to enforce HOV parking. The facility is directly connected to rapid transit rail line, bus terminal, and Kiss-n-Ride area.

3. LOCATION: CTA Cumberland Station, O'Hare line. Opened May 1992

4. SERVICE CHANGE (Change in bus or rail service): Not direct service change. CTA can review GFI farebox data for time period since May to study impact on bus service. Pace may have to perform same analysis. CTA has requested information from CDOT on any impact studies performed before project. Rail ridership has been off since the April flooding. Additionally, rail ridership is being affected by the economy, fare increases, Kennedy construction, and the increased availability of parking in the CBD. In August 1992, CTA distributed a free, one day parking voucher at the toll booths on the Tollway. It was good during a one week period. The voucher had a small ridership survey on back, data not available at this time.

5. TCM CAPACITY (Increase in space or usage): 750 new spaces on two new decks. HOV and Disabled occupancy on first floor.

6. RIDERSHIP:
   a. Current: 1991 annual rail traffic at Cumberland station 1.48 million. November weekday station entering traffic 5,050.

| CTA Route | Ridership | | Headways | | | | Bus Req'ts. | Bus Miles |
|---|---|---|---|---|---|---|---|---|
| | Mar. '91 | Mar. '92 | A.M. | Base | P.M. | Eve. | Rush/Base | |
| 69 | 500 | 530 | 20 min | 20 min | 20 min | 20 min | 1/1 | 197 |
| 81W | 2,210 | 2,220 | 12 min | 20 min | 12 min | 20 min | 5/3 | 1,827 |

Pace routes, average weekday riders, 2nd Quarter 1992:

| | |
|---|---|
| Route 240 | 924 |
| Route 241 | 639 |
| Route 290 | 5,506 |
| Route 331 | 1,726 |

b. Expected Change (+/-): needs to be measured

7. CONNECTING ROADWAY IMPACTS
   a. Capacity: Cumberland at entrance ADT estimated at 40,000
   b. Usage: 2,000 or one lane
   c. Expected Change: not known

8. SECONDARY BENEFITS: Increased use of O'Hare line; increase in non-CBD commuters parking in lot and riding a bus or walking to work); decreased use of expressway; people who are using commercial space for transit parking may shift to lot.

9. SECONDARY DEFICITS: Cold start issue and increased use of local roadways. Possibility of decreased use of feeder buses.

10. COST: CTA will get from CDOT. Was an FHWA funded project.

11. RELATIONSHIP TO ETR PLANS
   a. Direct: none
   b. Indirect: only if employer is supporting parking and/or rail fare

12. ISSUES/CONCERNS: Difficulty in estimating changes in bus ridership due to other ridership variables. May have to fund user surveys. (Note: Survey of Preferential Parking performed in September by NIPC. Results due to Operation Green Light, Local Development Policy Task Force in November.)

## PROJECT PROFILE

1. TCM TYPE: Number 3, Train Station Redesign

2. PHYSICAL DESCRIPTION: Expansion and enlargement of existing station and alteration of usage patterns to facilitate flow through the station of 20,000 boarding passengers. The length of the train platform would be nearly doubled by adding approximately 400 feet. The installation of an elevator will be added to allow access to disabled individuals. The bus bridge will be extended by 406 feet to allow for the separation of boarding and alighting of buses. Greyhound's intercity buses would be relocated to the east side of the station to reduce conflicts with CTA feeder buses.

3. LOCATION: CTA 95th Street Station, Dan Ryan line (west- south) 95th and State Streets

4. SERVICE CHANGE (Change in bus or rail service): The station was designed for approximately 11,000 patrons. The volume of users (20,000), the large number of buses, the general traffic congestion around station, result in inconvenience and travel time delays. While not a direct service change. May result in faster service, and reduced number of buses after reduction of congestion. In 1993 Dan Ryan will be paired with Howard(north) line. CTA can review GFI farebox data. Rail ridership off since April flooding and additionally rail ridership off due to economy, fare increases, Kennedy construction, increased availability of parking in the CBD.

5. TCM CAPACITY (Increase in space or usage): The extended train station platform would provide more space per passenger--even if ridership levels increased--and reduce the potential for conflicts between boarding and alighting passengers.

6. RIDERSHIP

   a. Current: 1991 annual rail traffic at 95th station 6 million. November weekday station entering traffic 20,150. Over 4/5 of the riders arrive at the station via one of fourteen bus routes, thirteen of which must maneuver through heavy traffic on 95th Street.

   CTA Bus route performance March 1992:

| | |
|---|---|
| Route 29 | 14,910 |
| Routes 34/119 | 12,560 |
| Route 108 | 4,730 |
| Route 112 | 3,610 |
| Route 111/104 | 7,230 |
| Route 95E | 6,500 |
| Route 95W | 5,900 |

CTA con't

| | |
|---|---|
| Route 100 | 1,040 |
| Route 106 | 4,730 |
| Route 103 | 4,220 |

Pace has three routes into the station:

| | |
|---|---|
| Route 352 | 5,886 |
| Route 353 | 4,515 |
| Route 381 | 5,171 |

b. Expected Change (+/-): needs to be measured

7. CONNECTING ROADWAY IMPACTS
   a. Capacity:
   b. Usage: Approximately 37,000 vehicles pass the station entrance at 95th Street every day. To the east and west are State and Lafayette streets which combined carry 20,000 vehicles daily. During the peak morning hour 288 bus movements occur at the station. These compete with the 4,200 other traffic movements through the two nearby intersections.
   c. Expected Change: none expected

8. POTENTIAL BENEFITS: Facilitate bus movement; improve reliability of bus service; shorten trip time; increase attractiveness; and improvement in local roadway speeds.

9. POTENTIAL DEFICITS: Bus idling issue. Many of the vehicles on the streets adjacent to the 95th/Dan Ryan station are exiting or entering the expressway. Modifications to the station would not eliminate traffic congestion.

10. COST: $24.9 million in 1986 dollars

11. RELATIONSHIP TO ETR PLANS
    a. Direct: none
    b. Indirect: only if employer is supporting rail fare

12. ISSUES/CONCERNS: The project remains in the planning phase. It is not in the TIP for capital funding. If other plans go forward for line extension the project would be changed.

## PROJECT PROFILE

1. TCM TYPE: Number 4, Transportation Center/Transfer Facility

2. PHYSICAL DESCRIPTION: The transportation center/transfer facility is designed to open with 10 bus berths, which includes some excess capacity. Some berths are for the Limited and Express bus routes and others are for two Dial-a-Ride services. Vanpools will use facility as a pick up point coming through the Kiss-n-Ride area. A 200 space Park-n-Ride lot is also provided.

   The project is in the TIP for land acquisition and design engineering. Will be ready to go to a capital grant in FY 1993.

3. LOCATION: Pace facility on a 5 acre site at Martingale and Kimberly in Schaumburg. Near Higgins and Woodfield Roads

4. SERVICE CHANGE (Change in bus or rail service): Pace Routes #606 primarily reverse commute and #757 a reverse commute service, as well as Woodfield routes #209, #696, #699, will be routed into facility with Dial-a-Ride services. The Dial-a-Ride services are in the general Schaumburg area and a midday shuttle. Shuttle service may increase to all day. All services into the facility will be pulse operations.

   Park-n-Ride lot will have 200 spaces because of the high residential nature of market area. May people riding these routes are currently parking in commercial lots along the route. May be able to fill 80% of the spaces when facility opens.

   Regular routes coming into this facility are really Limited Express Buses. They have an express portion but actually use major arterials for long periods.

   Vanpool service started up in September '91. Currently 50 vans are in service with 70 expected by the end of October '92.

   Facility will replace Woodfield Shopping Center as a terminal but service will still go through Woodfield.

5. TCM CAPACITY (Increase in space or usage): Same, this is a new facility.

6. RIDERSHIP

   a. Current: Average weekday riders, 2nd quarter 1992:

| | |
|---|---|
| Route 606 | 1,396 |
| Route 757 | 314 |
| Route 209 | 2,261 |

| | |
|---|---|
| Route 696 | 454 |
| Route 699 | 389 |

b. Expected Change (+/-) Facility can accommodate 7,000 riders per day or 32,000 trips. Expect some trips will be related to Sears move to Hoffman Estates.

7. CONNECTING ROADWAY IMPACTS:

a. Capacity:

b. Usage: Martingale and Kimberly are minor street with low usage. Higgins and Woodfield road are major arterials. The impact of Pace service on the roadways is so low that it could be considered part of the error curve.

c. Expected Change: Change on minor streets would possibly be significant, but they are low volume roadways now. Intersection with major arterials is signalized and movements are planned for right in and right out.

8. POTENTIAL BENEFITS: Faster inter- and intra-modal transfers. More safe, comfortable and reliable transfers. More reliable bus service. Mode shifting possible with increase in reliability of bus service. Possible reductions in VMT for autos, auto trips and emissions.

9. POTENTIAL DEFICITS: Increases in bus emissions from increases in service. Cold start issue for Park-n-Ride lot. Bus idling issues unless controlled. Increased usage of local roads.

10. COST: $3,000,000

11. RELATIONSHIP TO ETR PLANS:

a. Direct: If employers are encouraging transit usage and/or subsidizing transit costs.

b. Indirect: Possible mode shift

12. ISSUES/CONCERNS:

a. Bus idling is a difficult issue. Some older buses may not restart when turned off at transfer facilities. May be causing more emission difficulties due to need to cold start a new bus to replace bus in service.

b. Concerned that regional focus is on maintaining the current system. Pace's projects have growth in market area focus. The real issue may be the relative importance to air quality of these different focuses.

c. Issues for Pace are service reliability and speed.

## PROJECT PROFILE

1. TCM TYPE: Number 5, Distributor Bus Route Design/Schedule Coordination

2. PHYSICAL DESCRIPTION: Initiation of feeder bus service from the rail station to the surrounding commercial and industrial businesses. Metra is paying Pace to perform a three month (Oct 19 to Jan 19) test of bus service.

   While studying reverse commute found 32 people were getting off outbound trains and walking to destinations. Do not have hard numbers on suburb to suburb commuters. In a survey of 38 companies in the Wood Dale area received responses from 19 companies that 350 people live along the Milwaukee Road Line both east and west of Wood Dale.

3. LOCATION: Metra, Wood Dale rail station, Milwaukee District/West Line.

4. SERVICE CHANGE (Change in bus or rail service): Among service changes effective 9/6/92 a train stop was added in Wood Dale to accommodate suburb to suburb commute and additional City of Chicago stops were added to attract reverse commuters. These changes were made within the capacity of currently scheduled trains. Two buses with a 2-3 minute connection will meet every inbound and outbound train. During the month of October (October 10-31) the bus ride will be free. In November the fare will go to 85 cents or riders can buy the Link-up pass for $36.00. This will be in addition to the regular Metra zone fare. Service will be provided to the Oakwood, Chancellary, and Hamiliton Lakes business parks. Metra is attempting to attract people driving from west as well as reverse commuters.

   Metra is working with Wood Dale companies to offer a free round trip ticket promotion to employees living in specific zip codes along the rail line.

5. TCM CAPACITY (Increase in space or usage): As a new service will be the same.

6. RIDERSHIP:
   a. Current: 32 riders on 3 outbound trains from 6:28am to 7:50am;
      12 riders on 6 inbound trains from 5:00am to 7:42am.
   b. Expected Change (+/-) The minimum fare box recovery rate of 17% would be met with 46 riders. This is not enough to keeping service without a subsidy.

7. CONNECTING ROADWAY IMPACTS:
   a. Capacity:
   b. Usage: Mayor of Wood Dale reports 7-9 a.m. gridlock and vacant streets after 10 a.m.
   c. Expected Change: Dependent on success of service

8. POTENTIAL BENEFITS: Mode shifting from auto to bus and rail. Reduction in auto trips.

9. POTENTIAL DEFICITS: None identified by Metra

10. COST: One bus costs $12,500 for the three month period.

11. RELATIONSHIP TO ETR PLANS:
    a. Direct: employers in area are required to achieve a 25% increase in single auto occupancy by November 1996.
    b. Indirect: none

12. ISSUES/CONCERNS: The service is only a three month test. The service will be evaluated after the test period to determine the success in creating a market of reverse and suburb-to-suburb commuters on public transportation.

## PROJECT PROFILE

1. TCM TYPE: Number 6, Bus Signal Preemption

2. PHYSICAL DESCRIPTION: Buses will only preempt signal changes when behind schedule and not in conflict with emergency vehicles.

3. LOCATION: Cermak Road, 54th Ave. (Douglas 'L') to North Riverside Park Mall (1.5 miles)

4. SERVICE CHANGE (Change in bus or rail service): Pace Route #304--30 minute service, Route #322--30 minute service; CTA Route #25--30 minute service. Translates into 10 minute headway on the common section which is where signal preemption is being studied. If becomes a capital grant IDOT Highway Division will probably install equipment at intersections. Pace and CTA will install equipment on vehicles. May result in faster service and reduced number of buses. May affect VMT if increases the number of riders who change modes.

   Separate from the IDOT study, Pace has acquired from Vapor Corp. equipment to test the technique of signal preemption. Actual preemption will not occur but Pace will be able to collect data from buses to assure that information is coming in clearly and to test for false positives and negatives. The current IDOT signal equipment may be good enough to use as is. IDOT will install necessary equipment in the street.

5. TCM CAPACITY (Increase in space or usage): Same, any excess capacity on vehicles will be able to accommodate increases in ridership.

6. RIDERSHIP

   a. Current:

| CTA Route | Ridership | | Headways, Combined with Pace | | | | Bus Req'ts. | Bus Miles |
|---|---|---|---|---|---|---|---|---|
| | Wkday. | Sat. | A.M. | Base | P.M. | Eve. | Rush/Base | |
| 25 | 930 | 1,140 | 12 min | 10 min | 10 min | 10 min | 2/2 | 199 |

Pace routes, average weekday riders, 2nd quarter 1992:

Route 322 3,753

Route 304 1,348.

b. Expected Change (+/-) +2% for CTA. On a weekday this would translate into approximately 18 passengers. Pace expects ridership increases of +5%.

7. CONNECTING ROADWAY IMPACTS:
   a. Capacity: need data
   b. Usage: need data
   c. Expected Change: may increase on roadways with bus preemption.

European practice is for bus signal preemption to give the buses as little as 3 seconds out of the standard cycle. The impact on cross streets should be negligible.

8. POTENTIAL BENEFITS: Faster roadway movements on bus streets, reduction in bus stopping and start up emissions, reduced street congestion and reduced bus bunching. Mode shifting possible with increase in reliability of bus service. Possible reduction in VMT for autos, auto trips and emissions. Possible increase in arterial operating speeds.

9. POTENTIAL DEFICITS: Increases in emissions from autos on connecting streets were traffic movement is altered.

10. COST: IDOT study need amount; Pace technique test $45,000

11. RELATIONSHIP TO ETR PLANS:
   a. Direct: none
   b. Indirect: Possible mode shift

12. ISSUES/CONCERNS:
   a. Technology is new to USA and impacts are difficult to quantify. IDOT has agreed not to evaluate cost reductions in terms of saving whole buses but rather in percent of running time saved, because percentage issue is a better number to apply to other routes.

   b. Issues for Pace are service reliability and speed.

## PROJECT PROFILE

1. TCM TYPE: Number 7, Restricted Use Lanes/Facilities for Transit Vehicles

2. PHYSICAL DESCRIPTION: Pace buses will be able to go through the automated toll lane without stopping by using Automatic Vehicle Identification (AVI). The tollway is rebuilding the toll plaza to widen all automatic lanes to 10 feet. Previously they were 8 1/2 feet and buses could not fit. Tollway has a Request for Proposals out for a prototype AVI system on the North-South Tollway. The leasing of the transmitter will be about $40.00.

3. LOCATION: Pace service on tollway. Toll Plaza located at Interstate 294 and Route 83.

4. SERVICE CHANGE (Change in bus or rail service): Pace Routes #888 and #877 use the plaza. Bumper to bumper delays are currently experience. May be able to cut running time on these routes. Expect to be able to handle any increases in ridership with current capacity.

5. TCM CAPACITY (Increase in space or usage): Same no capacity change is expected.

6. RIDERSHIP:
   a. Current: Pace routes, average weekday riders, 2nd quarter 1992:
      Route 888 80
      Route 877 222
   b. Expected Change (+/-): Expect increases in ridership no calculation made.

7. CONNECTING ROADWAY IMPACTS:
   a. Capacity: need data
   b. Usage: Toll plaza is heavily used and major delays are experienced.
   c. Expected Change: No change or increase in usage as congestion decreases.

8. POTENTIAL BENEFITS: Reducing bus delays, increases in safety, and faster roadway movement. Possible reductions in VMT if mode shifting occurs.

9. POTENTIAL DEFICITS: Increases in bus emissions from increases in service. Increased usage of expressway.

10. COST: to Pace $40.00 per month plus tolls

11. RELATIONSHIP TO ETR PLANS:

a. Direct: none

b. Indirect: Possible mode shift

12. ISSUES/CONCERNS:

a. The physical limits of the area's geography prevent addition of a transit lane at this plaza.

b. Concerned that regional focus is on maintaining the current system. Pace's projects have growth in market area focus. The real issue may be the relative importance to air quality of these different focuses.

c. Issues for Pace are service reliability and speed.

## PROJECT PROFILE

1. TCM TYPE: Number 8, Automatic Vehicle Location/Control and Bus Signal Preemption

2. PHYSICAL DESCRIPTION: CTA's Bus Service Management System (BSMS) is a RTA and FTA funded capital project. Permits management of bus schedule adherence, bus location and assurance of employee and rider security. Buses may preempt signal changes except when ahead of schedule. City of Chicago will install equipment at intersections (as a subcontractor). CTA contractor installs on vehicles. In initial portion BSMS includes 5 signalized intersections on King Drive and 162 buses (including 45 for King Drive). Upon acceptance, RFP calls for the rest of CTA's buses and 195 additional intersections throughout the system to be equipped.

3. LOCATION: King Drive, 43rd to 51st (1 mile)

4. SERVICE CHANGE (Change in bus or rail service): Route #3 King Drive requires 41 buses in the rush; every four to five minutes of running time equals a bus (1 interval). May result in reduction of bus bunching, faster service, decreased stopping, and decrease in number of buses needed on the route.

5. TCM CAPACITY (Increase in space or usage): Same, any excess capacity resulting from same number of vehicles being able to make more trips will be able to accommodate increases in ridership induced by more reliable, faster service.

6. RIDERSHIP

   a. Current: From Operating Facts (5/11/92) Average weekday 64 riders per bus. Weekday round trips 180.

| CTA route | Ridership | | Headways | | | | Bus Req'ts. | Bus Miles |
|---|---|---|---|---|---|---|---|---|
| | Wkday. | Sat | A.M. | Base | P.M. | Eve. | Rush/Base | |
| 3 | 18,000 | 10,000 | 4 min | 6 min | 5 min | 7.5 min | 41/22 | 4,543 |

   b. Expected Change (+/-) +3% for CTA. On a weekday this would translate into approximately 540 additional passengers, increasing ridership to 66 per bus.

7. CONNECTING ROADWAY IMPACTS:

   a. Capacity: need data

   b. Usage: need data

   c.Expected Change: may increase on roadways with bus preemption.European practice for bus signal preemption is to give buses as little as 3 additional seconds out of the standard cycle. The impact on cross streets should be negligible.

8. POTENTIAL BENEFITS: Faster roadway movements on bus streets, reduction in bus stopping and start up emissions, reduced street congestion and reduced bus bunching. Mode shifting possible with increase in reliability and faster bus service. Possible reduction in VMT for autos, auto trips and emissions. Increase in employee and rider safety and security. Decrease in operational costs due to reduction in bus supervision expenses.

9. POTENTIAL DEFICITS: Increases in emissions from autos on connecting streets where traffic movement is altered.

10. COST: $850,000--allocation of costs for 45 buses (including spares and signal equipment from total project costs of $40 million.

11. RELATIONSHIP TO ETR PLANS:

   a. Direct: none

   b. Indirect: Possible mode shift

12. ISSUES/CONCERNS:

   a. Technology is new to USA and impacts are difficult to quantify. On King Drive test, have agreed not to evaluate cost reductions in terms of saving whole buses but rather in percent of running time saved, because percentage of time saved is a better number to apply to other routes.

   b. CTA Bus Service Management System implementation is moving faster than the feasibility study on Cermak Road and may be operational before the feasibility study is finished.

   c. Impact on transit ridership may be underestimated since the signal pre-emption is in place for only a small portion of the total bus route at this time.

## PROJECT PROFILE

1. TCM TYPE: Number 9, Subscription Bus Service

2. PHYSICAL DESCRIPTION: Pace will offer specialized service to address the specific needs of suburban employees. The service provides direct transportation between a residential collection area and a place of employment for groups of 30 or more individuals. It operates according to a prescribed schedule and travels along a designated route, with passengers offered a guaranteed seat in return for reserving transportation in a monthly basis. Service is "open door" in that it is not restricted to employees of specific firms.

   Vehicles and drivers are provided by a private carrier. The vehicle is normally an "over the road" bus.

3. LOCATION: Pace service will be provided from SW side of Chicago to new Sears Headquarters in Hoffman Estates.

   New service will reflect that currently provided to Sears Catalog sales facilities. Route runs from Naperville to Skokie.

4. SERVICE CHANGE (Change in bus or rail service): Sears is assisting in the development of up to 14 routes. Service will be phasing in as people are transferred from the Sears Tower to Hoffman Estates. Transition will occur through November. Sears store parking lots to be used as pick-up points.

   Service will mirror Naperville-Skokie Route. It has 2 pick-up points, one at a Park-n-Ride lot and another at a train station. Actually picking up riders who travel by train from further out suburbs. Other riders use a variety of approaches to pick-up point: drive, kiss-n-ride, and bus.

5. TCM CAPACITY (Increase in space or usage): Up to 14 new routes.

6. RIDERSHIP:
   a. Current: none
   b. Expected Change (+/-) Average of 30 riders per vehicle. Sears is looking to get a 30% share of trips into the new headquarters. Transit, including car pools, had an 80% share of trips to the Sears Tower.

7. CONNECTING ROADWAY IMPACTS:
   a. Capacity:
   b. Usage:
   c. Expected Change: All new roadways for Sears new headquarters.

8. POTENTIAL BENEFITS: Capturing of the people in carpools onto Subscription service or vanpools. Increases in safety and faster roadway movement. Possible reductions in auto trips if mode shifting occurs. Development of Park-n-Ride or walk to transit users.

9. POTENTIAL DEFICITS: Increases in bus emissions from increases in service. Increased usage of expressway. Increased traffic in Hoffman Estates. Increased traffic around stores. Mode shift from regular bus and train service to autos causing a increase in trips.

10. COST: Naperville-Skokie fare is $70.00 per month. Yearly costs to Pace is $73,000 for driver and fuel. Farebox recovery is 60%. Sears will underwrite new service for a year.

11. RELATIONSHIP TO ETR PLANS:
   a. Direct: Sears is required to comply with ETR programs and agreement with Hoffman Estates requires provision of transit service.
   b. Indirect: Not applicable

12. ISSUES/CONCERNS:
   a. If transit service grows at these locations it may justify the initiation of Express bus service from certain locations to Hoffman Estates.

   b. Need to remember that a significant number of Sears Tower employees were carpool riders. Initiation of subscription service may actually transferring these riders to higher occupancy vehicles.

   c. Concerned that regional focus is on maintaining the current system. Pace's projects have growth in market area focus. The real issue may be the relative importance to air quality of these different focuses.

   d. The market area for this subscription service is very diffuse and could not effectively supply ridership for a fixed route service.

   e. Issues for Pace are service reliability and speed.

## PROJECT PROFILE

1. TCM TYPE: Number 10, Vanpools

2. PHYSICAL DESCRIPTION: As a new service initiative, Pace is integrating vanpool operations into its service mix. These operations address the transit needs of area employees on a smaller scale than subscription bus service. Vanpools generally consist of six to fifteen persons commuting to a common employment site. Three vehicle sizes;: Mini - 6 to 7, Conversion - 8 to 11, and Maxi - 12 to 15 persons; are available to participants to accommodate groups of various sizes.

   Vanpool operations have fares based on the distance travelled and number of van passengers. Program administration, including vanpool matching, is handled by Pace staff. Fleet maintenance is provided by a variety private contractors. Fueling is at private gas stations through the use of a credit card. A guaranteed ride home in emergencies is provided at a limit of up to $90.00 each year.

   Each vanpool customer reserves and pays for service in advance and is issued a pass. Drivers are permitted 300 free miles per month personal use of the van and receive a credit of up to the amount of the applicable fare for that van in consideration of their driving the vehicle. Drivers must pass a Department of Transportation approved physical and must comply with transit drug testing procedures.

3. LOCATION: Entire Pace service area with some analysis potential on the Sears service from a variety of Chicago and suburban locations to new Sears Headquarters in Hoffman Estates.

4. SERVICE CHANGE (Change in bus or rail service): Sears is assisting in the development of up to 42 vanpools. Thirteen are currently organized. Service will be phased in as people are transferred from the Sears Tower to Hoffman Estates. Transition will occur through November.

   Two different types of pick-ups. One is the collection of individuals along the route with others at some common point. The second is the collection of individuals at a multiple of common points.

5. TCM CAPACITY (Increase in space or usage): Up to 42 new routes by November 1992. Regional service beyond the Sears component is 52. Projection of 70 by end of October, with authorization by Pace Board for 123 by of 1992.

6. RIDERSHIP:

a. Current: On an average of 8.5 passengers per van. Regional program of 52 vans is carrying 495 to 500 as of September 8, 1992.

b. Expected Change (+/-) The total Sears program of 42 would be carrying 350 to 400 riders. The projected additional program of 70 would be carrying about 600 to 650 riders per day and could expect 300,000 trips during the year.

Sears is looking to get a 30% share of trips into the new headquarters. Transit, including car pools, had an 80% share of trips to the Sears Tower.

7. CONNECTING ROADWAY IMPACTS:

a. Capacity:

b. Usage:

c. Expected Change: All new roadways for Sears new headquarters. May reduce usage on three different corridors leading into site.

8. POTENTIAL BENEFITS: Diversion from auto may be as high as 90%. Capturing of the carpool riders onto service or vanpools. Increases in safety and faster roadway movement. Possible reductions in auto trips if mode shifting occurs. Development of Park-n-Ride or walk to transit users.

9. POTENTIAL DEFICITS: Increases in emissions from increases in service. Increased usage of expressway. Increased traffic in Hoffman Estates. Increased traffic around stores. Mode shift from regular bus and train service to autos causing a increase in trips. Cold start issue at Park-n-Ride lots. It should be noted that the absolute number of vehicles at headquarters will be much less due to the existence of the vanpools

10. COST: Entire vanpool service costs $2.2 million each year. Farebox recovery is 90%. Average per trip subsidy is 7 cents. Sears will underwrite new service for a year. The 7 cents per trip is a weighted amount. As the program expands the mix of fare zones and subsidies will vary even though farebox recovery will be the same. The current average range is 7 to 30 cents per trip.

Fares are on a matrix by zones, by distance.

11. RELATIONSHIP TO ETR PLANS

a. Direct: Sears is required to comply with ETR programs and agreement with Hoffman Estates requires provision of transit service. Sears has agreed to support up to 42 van pools. Pace is working with other area employers to establish vanpool operations.

b. Indirect: Not applicable

12. ISSUES/CONCERNS:

a. If transit service grows at these locations it may justify the initiation of other subscription buses and hopefully Express bus service from certain locations to Hoffman Estates.

b. Need to remember that large numbers of Sears Tower employees were carpool riders. Initiation of vanpool service may actually transferring these riders to higher occupancy vehicles.

c. There is a difficulty in measuring the actual effects of vanpools on the connecting corridors.

d. Will soon survey all vanpools to ask how riders would have gotten to work if the van was not available.

e. Would prefer that entire vanpool service be analyzed and not just the Sears component.

f. Concerned that regional focus is on maintaining the current system. Pace's projects have growth in market area focus. The real issue may be the relative importance to air quality of these different focuses.

g. Issues for Pace are service reliability and speed.

## PROJECT PROFILE

1. TCM TYPE: Number 11, Transit Fare Subsidy/Marketing

2. PHYSICAL DESCRIPTION: Transit Check program. Employer sends form and check to RTA. Checks can be issued in denominations of $10.00, $15.00 or $21.00. Transit Check can be used like cash any where that tokens or passes are sold.

   The checks can be ordered three months in advance and are good for 120 days after date of issue.

   The checks are tax free to employee and a tax deductible business expense to employers.

3. LOCATION: RTA sponsored and administered and available to any regional employer.

4. SERVICE CHANGE (Change in bus or rail service): No effect on bus or rail service.

5. TCM CAPACITY (Increase in space or usage): Not applicable

6. RIDERSHIP:
   a. Current: 6,500 checks issued through 275 employers.
   b. Expected Change (+/-) The effect of this TCM should be positive, especially if subsidy level is raised to $60.00 as proposed in Energy bill.

7. CONNECTING ROADWAY IMPACTS:
   a. Capacity: None
   b. Usage: None
   c. Expected Change: If early service survey is correct and 15% of users are new transit riders could reduce roadway usage.

8. POTENTIAL BENEFITS: Mode shifting from auto to bus and rail. Reduction in auto trips and vehicle miles traveled.

9. POTENTIAL DEFICITS: Induced travel possible if an additional vehicle is available for family usage. Employers need to understand that RTA is not responsible for employer getting tax benefits.

10. COST: RTA currently includes cost in employees salary and not from income from Transit Check. The cost to employers is the actual amounts of the transit checks.

11. RELATIONSHIP TO ETR PLANS:

    a. Direct: employers in area are required to increase auto vehicle occupancy 25% by November 1996.

12. ISSUES/CONCERNS: Some employers did not realize that only one check could be used per person, per month. This could be especially important if the level is raised to $60.00 and more companies become involved.

## PROJECT PROFILE

1. TCM TYPE: Number 12, Capacity/Speed Improvements for Transit Service

2. PHYSICAL DESCRIPTION: Grade Separation, at rubber railroad crossing, of roadway (FAU2714) and Metra commuter rail line (Milwaukee Road, West line). The crossing was installed in 1990. The roadway is within the municipality and is maintained by the municipality. At this crossing there are four tracks. Two are under Metra's jurisdiction, one is under the Indiana Harbor Belt RR and the fourth is under the Soo Line's jurisdiction. The Indiana Harbor Belt a freight line. The Soo Line's track is a freight line and a yard lead. Substantial freight movements slow traffic.
   Commuter trains block the roadway when stopping for the station. Pedestrian traffic is blocked from crossing the tracks when walking from the parking lots to the station. Two of the three parking lots are opposite the inbound platform. Parking lot spaces equal 264 and are used at the 86.7% rate. Some capacity is available.

3. LOCATION: Metra, Franklin Park rail station, Rose Street/25th Avenue; Milwaukee Road West line.

4. SERVICE CHANGE (Change in bus or rail service): None anticipated at this time. Where ridership to increase and train capacity an issue, would first add a car, if possible, before adding a train. Most trains from Elgin to Chicago stop at this station. Although some run at near capacity others have additional capacity.

5. TCM CAPACITY (Increase in space or usage): Same

6. RIDERSHIP
   a. Current: Fall 1991 weekday, inbound boardings = 490; outbound alightings = 441.
   b. Expected Change (+/-): Should have a positive impact. Metra has no handle in travel time change or elasticity information. Could say that easy access to parking and to walk-in traffic will encourage usage. With parking spaces numbering 264, up to 46% of the riders could be walking or riding buses in the station.

7. CONNECTING ROADWAY IMPACTS
   a. Capacity: need data
   b. Usage: 12,900
   c. Expected Change: May go up as roadway congestion decreases.

8. POTENTIAL BENEFITS: Train movements currently slow roadway and pedestrian traffic. Access to parking lots will be improved. Decreases in congestion will possibly reduce emissions causes by stopping and idling. With grade separations remove the risk of train/vehicle collisions.

9. POTENTIAL DEFICITS: Increased capacity and reduced roadway congestion can lead to increases in induced travel.

10. COST: Current general cost estimates for grade separations is $6,000,000.

11. RELATIONSHIP TO ETR PLANS:
    a. Direct: None
    b. Indirect: Only if employer is paying for parking or rail fare.

12. ISSUES/CONCERNS: The project is still in the idea stage of the planning phase. It is difficult to analyze at this stage. No idea if separation will occur above or below grade. May have been better to compare a project further along in the developmental process. Hanover Park could be considered.

# Appendix B
# MOBILE5 Input File

```
1           PROMPT -
MOBILE5 Emission Factors for Chicago Area for 1990 with basic I/M
1           TAMFLG -
1           SPDFLG -
1           VMFLAG -
1           MYMRFG -
1           NEWFLG -
2           IMFLAG - enter I/M program
1           ALHFLG -
1           ATPFLG - enter ATP, Press & Purge
5           RLFLAG - do not compute refueling emission factors
2           LOCFLG - enter LAP record once
1           TEMFLG -
3           OUTFMT - print 112 column descriptive output format
4           PRTFLG - print exhaust HC, CO and NOx results
1           IDLFLG - no idle emission factors
3           NMHFLG - print VOC
2           HCFLAG - print HC components
87 15 68 20 05 08 095 1 1 2222 2111                I/M 2500/Idle Test
Chicago 2Sp.Idle C  70.  96. 09.2 09.2 90 2 1 1    LAP record
.000 .300 .000 .035 2                              Oxyfuel record
1 90  3.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90  4.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90  5.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90  6.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90  7.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90  8.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90  9.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 10.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 11.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 12.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 13.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 14.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 15.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 16.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 17.0 87.0 20.6 27.3 20.6 1                    Scenario Record
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1 90 19.0 87.0 20.6 27.3 20.6 1                    Scenario Record
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1 90 27.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 28.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 29.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 30.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 31.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 32.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 33.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 34.0 87.0 20.6 27.3 20.6 1                    Scenario Record
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1 90 36.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 37.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 38.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 39.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 40.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 41.0 87.0 20.6 27.3 20.6 1                    Scenario Record
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1 90 42.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 43.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 44.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 45.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 46.0 87.0 20.6 27.3 20.6 1                    Scenario Record
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1 90 59.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 90 60.0 87.0 20.6 27.3 20.6 1                    Scenario Record
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1           PROMPT -
MOBILE5 Emission Factors for Chicago Area for 2020 with enhanced I/M
1           TAMFLG -
1           SPDFLG -
1           VMFLAG -
1           MYMRFG -
1           NEWFLG -
3           IMFLAG - enter I/M program
1           ALHFLG -
8           ATPFLG - enter ATP, Press & Purge
5           RLFLAG - do not compute refueling emission factors
2           LOCFLG - enter LAP record once
1           TEMFLG -
3           OUTFMT - print 112 column descriptive output format
4           PRTFLG - print exhaust HC, CO and NOx results
1           IDLFLG - no idle emission factors
3           NMHFLG - print VOC
2           HCFLAG - print HC components
83 20 68 20 03 03 096 1 1 2221 2211 220. 1.20 999. I/M 2500/Idle Test
83 20 86 20 03 03 096 1 1 2221 4211 0.80 20.0 2.00 I/M240 Program
83 84 20 2221 11 096. 12211111                     ATP
83 83 20 2221 11 096.                              Pressure Check
83 86 20 2221 11 096.                              Purge Check
Chicago Enhn. IM C  70.  96. 09.2 09.2 90 2 1 1    LAP record
.000 .300 .000 .035 2                              Oxyfuel record
1 10  3.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10  4.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10  5.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10  6.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10  7.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10  8.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10  9.0 87.0 20.6 27.3 20.6 1                    Scenario Record
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1 10 18.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 19.0 87.0 20.6 27.3 20.6 1                    Scenario Record
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1 10 38.0 87.0 20.6 27.3 20.6 1                    Scenario Record
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1 10 40.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 41.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 42.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 43.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 44.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 45.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 46.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 47.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 48.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 49.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 50.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 51.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 52.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 53.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 54.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 55.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 56.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 57.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 58.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 59.0 87.0 20.6 27.3 20.6 1                    Scenario Record
1 10 60.0 87.0 20.6 27.3 20.6 1                    Scenario Record
```

# Appendix C
# Emissions Calculations

CHICAGO 1990 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
PROTOTYPE TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 1 – W. Chicago St. – CNW West line
Additional Pk-n-Ride Lot

| COLUMN #: 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 29.442 | 169.048 | 4.194 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 20.577 | 132.058 | 3.977 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 15.884 | 108.353 | 3.817 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 13.007 | 91.833 | 3.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 11.073 | 79.678 | 3.583 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 9.982 | 70.381 | 3.491 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 9.139 | 63.056 | 3.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 8.443 | 57.146 | 3.340 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 7.855 | 52.285 | 3.278 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 7.349 | 48.220 | 3.222 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 6.906 | 44.772 | 3.173 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 6.514 | 41.810 | 3.128 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 6.162 | 39.238 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 5.842 | 36.980 | 3.054 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 5.550 | 34.980 | 3.022 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 5.279 | 33.194 | 2.994 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 5.027 | 31.585 | 2.969 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 4.822 | 30.209 | 2.951 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 | 26 | 26 | 4.670 | 28.971 | 2.942 | 119 | 739 | 75 | 121 | 753 | 76 |
| 22 | 530 | 519 | 4.531 | 27.834 | 2.936 | 2400 | 14740 | 1555 | 2352 | 14446 | 1524 |
| 23 | 483 | 474 | 4.401 | 26.784 | 2.930 | 2126 | 12941 | 1416 | 2086 | 12696 | 1389 |
| 24 | 441 | 441 | 4.281 | 25.812 | 2.926 | 1888 | 11385 | 1291 | 1888 | 11383 | 1290 |
| 25 | 987 | 979 | 4.168 | 24.908 | 2.923 | 4112 | 24573 | 2884 | 4080 | 24385 | 2862 |
| 26 | 901 | 895 | 4.063 | 24.066 | 2.922 | 3660 | 21681 | 2632 | 3636 | 21539 | 2615 |
| 27 | 632 | 632 | 3.964 | 23.280 | 2.922 | 2504 | 14708 | 1846 | 2505 | 14713 | 1847 |
| 28 | 513 | 513 | 3.872 | 22.545 | 2.923 | 1988 | 11574 | 1501 | 1986 | 11566 | 1499 |
| 29 | 796 | 792 | 3.784 | 21.859 | 2.925 | 3014 | 17410 | 2330 | 2997 | 17312 | 2317 |
| 30 | 533 | 533 | 3.702 | 21.218 | 2.929 | 1972 | 11300 | 1560 | 1973 | 11309 | 1561 |
| 31 | 528 | 527 | 3.624 | 20.620 | 2.934 | 1915 | 10896 | 1550 | 1910 | 10867 | 1546 |
| 32 | 615 | 615 | 3.550 | 20.062 | 2.939 | 2183 | 12339 | 1808 | 2183 | 12338 | 1807 |
| 33 | 709 | 711 | 3.481 | 19.543 | 2.946 | 2468 | 13857 | 2089 | 2475 | 13895 | 2095 |
| 34 | 490 | 465 | 3.415 | 19.061 | 2.955 | 1672 | 9332 | 1447 | 1588 | 8863 | 1374 |
| 35 | 736 | 712 | 3.353 | 18.614 | 2.964 | 2467 | 13697 | 2181 | 2387 | 13253 | 2110 |
| 36 | 569 | 476 | 3.294 | 18.201 | 2.975 | 1875 | 10361 | 1694 | 1568 | 8664 | 1416 |
| 37 | 271 | 220 | 3.238 | 17.820 | 2.987 | 876 | 4823 | 808 | 712 | 3920 | 657 |
| 38 | 460 | 391 | 3.186 | 17.471 | 3.000 | 1467 | 8042 | 1381 | 1246 | 6831 | 1173 |
| 39 | 245 | 231 | 3.136 | 17.151 | 3.015 | 769 | 4208 | 740 | 724 | 3962 | 696 |
| 40 | 29 | 29 | 3.089 | 16.859 | 3.031 | 88 | 482 | 87 | 90 | 489 | 88 |
| 41 | 21 | 21 | 3.044 | 16.595 | 3.049 | 64 | 347 | 64 | 64 | 348 | 84 |
| 42 | 0 | 0 | 3.002 | 16.356 | 3.068 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 0 | 0 | 2.962 | 16.142 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 2.924 | 15.950 | 3.113 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 2.888 | 15.779 | 3.138 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 2.854 | 15.627 | 3.165 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 2.821 | 15.492 | 3.195 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 2.790 | 15.370 | 3.228 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 2.774 | 15.391 | 3.334 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 2.759 | 15.417 | 3.443 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 2.746 | 15.450 | 3.554 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 2.733 | 15.490 | 3.668 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 2.721 | 15.536 | 3.784 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 2.709 | 15.589 | 3.903 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 2.699 | 15.649 | 4.025 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 2.762 | 18.355 | 4.150 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 2.826 | 21.068 | 4.279 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 2.890 | 23.791 | 4.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 2.955 | 26.523 | 4.547 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 3.021 | 29.265 | 4.687 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 10,514 | 10,202 | | | | | | | | | |
| | | -312 | | | | 39,629 | 229,437 | 30,936 | 38,573 | 223,533 | 30,008 |

| TOTAL TONS (Base): | |
|---|---|
| VOCs = | 0.044 |
| CO = | 0.253 |
| NOx = | 0.034 |

| TOTAL TONS (New): | |
|---|---|
| VOCs = | 0.043 |
| CO = | 0.246 |
| NOx = | 0.033 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | -0.001 |
| CO = | -0.007 |
| NOx = | -0.001 |

NOTE...Multiply by 4 to get tons per day.

CHICAGO 2010 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 1 – W. Chicago St. – CNW West line
Additional Pk-n-Ride Lot

COLUMN #:

| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 6.736 | 46.190 | 2.406 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 4.939 | 37.032 | 2.253 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 3.969 | 31.385 | 2.148 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 3.363 | 27.519 | 2.069 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 2.949 | 24.688 | 2.005 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 2.704 | 22.515 | 1.951 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 2.510 | 20.789 | 1.905 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 2.347 | 19.381 | 1.865 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 2.207 | 18.208 | 1.829 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 2.084 | 17.217 | 1.797 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 1.975 | 16.366 | 1.769 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 1.877 | 15.628 | 1.743 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 1.787 | 14.982 | 1.720 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 1.705 | 14.412 | 1.699 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 1.629 | 13.906 | 1.680 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 1.558 | 13.453 | 1.663 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 437 | 436 | 1.491 | 13.046 | 1.647 | 651 | 5695 | 719 | 650 | 5688 | 718 |
| 20 | 13 | 13 | 1.427 | 12.497 | 1.636 | 18 | 159 | 21 | 19 | 162 | 21 |
| 21 | 44 | 44 | 1.377 | 11.820 | 1.630 | 61 | 524 | 72 | 61 | 520 | 72 |
| 22 | 703 | 690 | 1.331 | 11.204 | 1.626 | 936 | 7879 | 1143 | 918 | 7731 | 1122 |
| 23 | 661 | 653 | 1.288 | 10.641 | 1.622 | 852 | 7038 | 1073 | 841 | 6949 | 1059 |
| 24 | 730 | 727 | 1.248 | 10.126 | 1.618 | 911 | 7389 | 1181 | 907 | 7362 | 1176 |
| 25 | 1,245 | 1,241 | 1.212 | 9.652 | 1.615 | 1509 | 12019 | 2011 | 1504 | 11978 | 2004 |
| 26 | 713 | 707 | 1.178 | 9.214 | 1.613 | 839 | 6565 | 1149 | 833 | 6514 | 1140 |
| 27 | 1,029 | 1,028 | 1.146 | 8.810 | 1.611 | 1180 | 9068 | 1658 | 1178 | 9057 | 1656 |
| 28 | 694 | 694 | 1.116 | 8.436 | 1.610 | 774 | 5851 | 1117 | 775 | 5855 | 1117 |
| 29 | 1,056 | 1,059 | 1.088 | 8.087 | 1.610 | 1149 | 8543 | 1701 | 1152 | 8564 | 1705 |
| 30 | 519 | 518 | 1.062 | 7.763 | 1.610 | 551 | 4027 | 835 | 550 | 4021 | 834 |
| 31 | 858 | 858 | 1.037 | 7.461 | 1.611 | 890 | 6401 | 1382 | 690 | 6402 | 1382 |
| 32 | 407 | 307 | 1.014 | 7.179 | 1.612 | 412 | 2920 | 656 | 311 | 2204 | 495 |
| 33 | 660 | 515 | 0.992 | 6.915 | 1.614 | 655 | 4565 | 1066 | 511 | 3561 | 831 |
| 34 | 1,068 | 838 | 0.971 | 6.667 | 1.616 | 1037 | 7123 | 1727 | 814 | 5587 | 1354 |
| 35 | 727 | 585 | 0.951 | 6.434 | 1.620 | 691 | 4678 | 1178 | 556 | 3764 | 948 |
| 36 | 415 | 301 | 0.932 | 6.216 | 1.623 | 387 | 2582 | 674 | 281 | 1871 | 489 |
| 37 | 216 | 179 | 0.914 | 6.011 | 1.628 | 197 | 1296 | 351 | 164 | 1076 | 291 |
| 38 | 264 | 228 | 0.897 | 5.817 | 1.633 | 237 | 1537 | 431 | 205 | 1326 | 372 |
| 39 | 117 | 117 | 0.881 | 5.635 | 1.639 | 103 | 658 | 191 | 103 | 659 | 192 |
| 40 | 0 | 0 | 0.866 | 5.464 | 1.645 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 | 0 | 0 | 0.851 | 5.302 | 1.652 | 0 | 0 | 0 | 0 | 0 | 0 |
| 42 | 0 | 0 | 0.837 | 5.149 | 1.660 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 0 | 0 | 0.823 | 5.004 | 1.669 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 0.810 | 4.868 | 1.678 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 0.798 | 4.739 | 1.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 0.786 | 4.618 | 1.700 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 0.774 | 4.503 | 1.712 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 0.763 | 4.395 | 1.725 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 0.760 | 4.399 | 1.770 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 0.756 | 4.404 | 1.816 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 0.753 | 4.411 | 1.863 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 0.750 | 4.420 | 1.911 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 0.748 | 4.431 | 1.961 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 0.745 | 4.443 | 2.012 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 0.743 | 4.458 | 2.064 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 0.752 | 4.801 | 2.118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 0.762 | 5.146 | 2.174 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 0.772 | 5.493 | 2.232 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 0.782 | 5.843 | 2.292 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 0.792 | 6.195 | 2.354 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 12,576 | 11,738 | | | | 14,041 | 106,518 | 20,336 | 13,221 | 100,851 | 18,980 |
| | | -838 | | | | | | | | | |

| TOTAL TONS (Base): | |
|---|---|
| VOCs = | 0.015 |
| CO = | 0.117 |
| NOx = | 0.022 |

| TOTAL TONS (New): | |
|---|---|
| VOCs = | 0.015 |
| CO = | 0.111 |
| NOx = | 0.021 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | -0.001 |
| CO = | -0.006 |
| NOx = | -0.001 |

**NOTE...Multiply by 4 to get tons per day.**

CHICAGO 1990 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
PROTOTYPE TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 2 – Cumberland St. – CTA Ohare line
Additional Parking for Pk-n-Ride

COLUMN #:

| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 29.442 | 169.048 | 4.194 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 20.577 | 132.058 | 3.977 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 15.884 | 108.353 | 3.817 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 13.007 | 91.833 | 3.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 11.073 | 79.678 | 3.583 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 9.982 | 70.381 | 3.491 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 9.139 | 63.056 | 3.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 8.443 | 57.146 | 3.340 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 7.855 | 52.285 | 3.278 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 7.349 | 48.220 | 3.222 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 6.906 | 44.772 | 3.173 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 6.514 | 41.810 | 3.128 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 6.162 | 39.238 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 5.842 | 36.980 | 3.054 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 5.550 | 34.980 | 3.022 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 5.279 | 33.194 | 2.994 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 32 | 31 | 5.027 | 31.585 | 2.969 | 162 | 1017 | 96 | 156 | 979 | 92 |
| 20 | 0 | 0 | 4.822 | 30.209 | 2.951 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 | 57 | 55 | 4.670 | 28.971 | 2.942 | 267 | 1654 | 168 | 257 | 1593 | 162 |
| 22 | 336 | 332 | 4.531 | 27.834 | 2.936 | 1523 | 9358 | 987 | 1504 | 9241 | 975 |
| 23 | 219 | 213 | 4.401 | 26.784 | 2.930 | 964 | 5867 | 842 | 937 | 5705 | 624 |
| 24 | 274 | 271 | 4.281 | 25.812 | 2.926 | 1173 | 7070 | 801 | 1160 | 6995 | 793 |
| 25 | 1,039 | 976 | 4.168 | 24.908 | 2.923 | 4331 | 25884 | 3038 | 4068 | 24310 | 2853 |
| 26 | 524 | 497 | 4.063 | 24.066 | 2.922 | 2128 | 12605 | 1530 | 2019 | 11961 | 1452 |
| 27 | 1,160 | 1,085 | 3.964 | 23.280 | 2.922 | 4597 | 26999 | 3389 | 4301 | 25259 | 3170 |
| 28 | 1,304 | 1,229 | 3.872 | 22.545 | 2.923 | 5051 | 29407 | 3813 | 4759 | 27708 | 3592 |
| 29 | 922 | 873 | 3.784 | 21.859 | 2.925 | 3487 | 20144 | 2695 | 3303 | 19083 | 2554 |
| 30 | 609 | 579 | 3.702 | 21.218 | 2.929 | 2255 | 12926 | 1784 | 2143 | 12285 | 1696 |
| 31 | 267 | 259 | 3.624 | 20.620 | 2.934 | 966 | 5496 | 782 | 939 | 5341 | 760 |
| 32 | 229 | 221 | 3.550 | 20.062 | 2.939 | 813 | 4596 | 673 | 785 | 4434 | 650 |
| 33 | 138 | 132 | 3.481 | 19.543 | 2.946 | 481 | 2700 | 407 | 459 | 2580 | 389 |
| 34 | 239 | 213 | 3.415 | 19.061 | 2.955 | 817 | 4560 | 707 | 727 | 4060 | 629 |
| 35 | 66 | 78 | 3.353 | 18.614 | 2.964 | 287 | 1595 | 254 | 262 | 1452 | 231 |
| 36 | 183 | 183 | 3.294 | 18.201 | 2.975 | 602 | 3326 | 544 | 603 | 3331 | 544 |
| 37 | 186 | 187 | 3.238 | 17.820 | 2.987 | 602 | 3315 | 556 | 606 | 3332 | 559 |
| 38 | 187 | 188 | 3.186 | 17.471 | 3.000 | 597 | 3273 | 562 | 599 | 3285 | 564 |
| 39 | 19 | 19 | 3.136 | 17.151 | 3.015 | 61 | 331 | 58 | 60 | 326 | 57 |
| 40 | 0 | 0 | 3.089 | 16.859 | 3.031 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 | 0 | 0 | 3.044 | 16.595 | 3.049 | 0 | 0 | 0 | 0 | 0 | 0 |
| 42 | 0 | 0 | 3.002 | 16.356 | 3.068 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 0 | 0 | 2.962 | 16.142 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 2.924 | 15.950 | 3.113 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 2.888 | 15.779 | 3.138 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 2.854 | 15.627 | 3.165 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 2.821 | 15.492 | 3.195 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 2.790 | 15.370 | 3.228 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 2.774 | 15.391 | 3.334 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 2.759 | 15.417 | 3.443 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 2.746 | 15.450 | 3.554 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 2.733 | 15.490 | 3.668 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 2.721 | 15.536 | 3.784 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 2.709 | 15.589 | 3.903 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 2.699 | 15.649 | 4.025 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 2.782 | 18.355 | 4.150 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 2.826 | 21.068 | 4.279 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 2.890 | 23.791 | 4.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 2.955 | 26.523 | 4.547 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 3.021 | 29.265 | 4.687 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 8,010 | 7,621 | | | | 31,164 | 182,124 | 23,486 | 29,647 | 173,259 | 22,346 |
| | | −389 | | | | | | | | | |

| TOTAL TONS (Base): | | TOTAL TONS (New): | |
|---|---|---|---|
| VOCs = | 0.034 | VOCs = | 0.033 |
| CO = | 0.201 | CO = | 0.191 |
| NOx = | 0.026 | NOx = | 0.025 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | −0.002 |
| CO = | −0.010 |
| NOx = | −0.001 |

NOTE...Multiply by 4 to get tons per day.

CHICAGO 2010 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 2 – Cumberland St. – CTA OHare line
Additional Parking for Pk-n-Ride

COLUMN #:

| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 6.736 | 46.190 | 2.406 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 4.939 | 37.032 | 2.253 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 3.969 | 31.385 | 2.148 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 3.363 | 27.519 | 2.069 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 2.949 | 24.688 | 2.005 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 2.704 | 22.515 | 1.951 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 2.510 | 20.789 | 1.905 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 2.347 | 19.381 | 1.865 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 2.207 | 18.208 | 1.829 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 2.084 | 17.217 | 1.797 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 1.975 | 16.366 | 1.769 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 1.877 | 15.628 | 1.743 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 1.787 | 14.982 | 1.720 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 1.705 | 14.412 | 1.699 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 1.629 | 13.906 | 1.680 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 1.558 | 13.453 | 1.663 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 14 | 14 | 1.491 | 13.046 | 1.647 | 20 | 178 | 22 | 21 | 183 | 23 |
| 20 | 0 | 0 | 1.427 | 12.497 | 1.636 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 | 16 | 17 | 1.377 | 11.820 | 1.630 | 22 | 193 | 27 | 23 | 201 | 28 |
| 22 | 69 | 69 | 1.331 | 11.204 | 1.626 | 92 | 775 | 112 | 92 | 773 | 112 |
| 23 | 155 | 152 | 1.288 | 10.641 | 1.622 | 200 | 1654 | 252 | 196 | 1617 | 247 |
| 24 | 204 | 199 | 1.248 | 10.126 | 1.618 | 255 | 2068 | 330 | 248 | 2015 | 322 |
| 25 | 296 | 285 | 1.212 | 9.652 | 1.615 | 358 | 2855 | 478 | 345 | 2751 | 460 |
| 26 | 190 | 189 | 1.178 | 9.214 | 1.613 | 223 | 1746 | 306 | 223 | 1741 | 305 |
| 27 | 673 | 635 | 1.146 | 8.810 | 1.611 | 771 | 5929 | 1084 | 728 | 5594 | 1023 |
| 28 | 975 | 922 | 1.116 | 8.436 | 1.610 | 1088 | 8227 | 1570 | 1029 | 7778 | 1484 |
| 29 | 703 | 672 | 1.088 | 8.087 | 1.610 | 765 | 5686 | 1132 | 731 | 5434 | 1082 |
| 30 | 530 | 496 | 1.062 | 7.763 | 1.610 | 563 | 4113 | 853 | 527 | 3850 | 799 |
| 31 | 400 | 364 | 1.037 | 7.461 | 1.611 | 415 | 2984 | 644 | 377 | 2716 | 586 |
| 32 | 113 | 102 | 1.014 | 7.179 | 1.612 | 114 | 810 | 182 | 103 | 732 | 164 |
| 33 | 52 | 52 | 0.992 | 6.915 | 1.614 | 51 | 356 | 83 | 52 | 360 | 84 |
| 34 | 8 | 8 | 0.971 | 6.667 | 1.616 | 8 | 52 | 13 | 8 | 53 | 13 |
| 35 | 88 | 78 | 0.951 | 6.434 | 1.620 | 84 | 569 | 143 | 74 | 502 | 126 |
| 36 | 62 | 54 | 0.932 | 6.216 | 1.623 | 58 | 384 | 100 | 50 | 336 | 88 |
| 37 | 133 | 128 | 0.914 | 6.011 | 1.628 | 122 | 802 | 217 | 117 | 769 | 208 |
| 38 | 119 | 119 | 0.897 | 5.817 | 1.633 | 107 | 695 | 195 | 107 | 692 | 194 |
| 39 | 84 | 85 | 0.881 | 5.635 | 1.639 | 74 | 476 | 138 | 75 | 479 | 139 |
| 40 | 20 | 20 | 0.866 | 5.464 | 1.645 | 17 | 107 | 32 | 17 | 109 | 33 |
| 41 | 19 | 19 | 0.851 | 5.302 | 1.652 | 16 | 102 | 32 | 16 | 101 | 31 |
| 42 | 0 | 0 | 0.837 | 5.149 | 1.660 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 0 | 0 | 0.823 | 5.004 | 1.669 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 0.810 | 4.868 | 1.678 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 0.798 | 4.739 | 1.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 0.786 | 4.618 | 1.700 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 0.774 | 4.503 | 1.712 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 0.763 | 4.395 | 1.725 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 0.760 | 4.399 | 1.770 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 0.756 | 4.404 | 1.816 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 0.753 | 4.411 | 1.863 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 0.750 | 4.420 | 1.911 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 0.748 | 4.431 | 1.961 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 0.745 | 4.443 | 2.012 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 0.743 | 4.458 | 2.064 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 0.752 | 4.801 | 2.118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 0.762 | 5.146 | 2.174 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 0.772 | 5.493 | 2.232 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 0.782 | 5.843 | 2.292 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 0.792 | 6.195 | 2.354 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 4,923 | 4,679 | | | | 5,425 | 40,759 | 7,947 | 5,160 | 38,788 | 7,553 |
| | | -244 | | | | | | | | | |

| TOTAL TONS (Base): | | TOTAL TONS (New): | |
|---|---|---|---|
| VOCs = | 0.006 | VOCs = | 0.006 |
| CO = | 0.045 | CO = | 0.043 |
| NOx = | 0.009 | NOx = | 0.008 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | -0.000 |
| CO = | -0.002 |
| NOx = | -0.000 |

NOTE...Multiply by 4 to get tons per day.

CHICAGO 1990 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
PROTOTYPE TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 3 – 95th St. Station – CTA Dan Ryan Line Station Expansion

| COLUMN #: 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 29.442 | 169.048 | 4.194 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 20.577 | 132.058 | 3.977 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 15.884 | 108.353 | 3.817 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 13.007 | 91.833 | 3.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 11.073 | 79.678 | 3.583 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 9.982 | 70.381 | 3.491 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 9.139 | 63.056 | 3.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 8.443 | 57.146 | 3.340 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 7.855 | 52.285 | 3.278 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 7.349 | 48.220 | 3.222 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 6.906 | 44.772 | 3.173 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 6.514 | 41.810 | 3.128 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 6.162 | 39.238 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 5.842 | 36.980 | 3.054 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 5.550 | 34.980 | 3.022 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 5.279 | 33.194 | 2.994 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 7 | 7 | 5.027 | 31.585 | 2.969 | 36 | 228 | 21 | 35 | 221 | 21 |
| 20 | 0 | 0 | 4.822 | 30.209 | 2.951 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 | 6 | 6 | 4.670 | 28.971 | 2.942 | 26 | 164 | 17 | 28 | 174 | 18 |
| 22 | 0 | 0 | 4.531 | 27.834 | 2.936 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 | 11 | 10 | 4.401 | 26.784 | 2.930 | 48 | 295 | 32 | 44 | 268 | 29 |
| 24 | 970 | 914 | 4.281 | 25.812 | 2.926 | 4151 | 25028 | 2837 | 3913 | 23592 | 2674 |
| 25 | 2,166 | 2,042 | 4.168 | 24.908 | 2.923 | 9029 | 53958 | 6332 | 8511 | 50862 | 5969 |
| 26 | 2,821 | 2,657 | 4.063 | 24.066 | 2.922 | 11462 | 67894 | 8243 | 10795 | 63943 | 7764 |
| 27 | 1,826 | 1,760 | 3.964 | 23.280 | 2.922 | 7239 | 42515 | 5336 | 7056 | 41438 | 5201 |
| 28 | 2,017 | 1,944 | 3.872 | 22.545 | 2.923 | 7810 | 45473 | 5896 | 7527 | 43827 | 5682 |
| 29 | 2,372 | 2,273 | 3.784 | 21.859 | 2.925 | 8976 | 51852 | 6938 | 8601 | 49686 | 6649 |
| 30 | 2,271 | 2,198 | 3.702 | 21.218 | 2.929 | 8409 | 48195 | 6653 | 8137 | 46637 | 6438 |
| 31 | 785 | 769 | 3.624 | 20.620 | 2.934 | 2845 | 16185 | 2303 | 2787 | 15857 | 2256 |
| 32 | 175 | 168 | 3.550 | 20.062 | 2.939 | 622 | 3513 | 515 | 596 | 3370 | 494 |
| 33 | 52 | 52 | 3.481 | 19.543 | 2.946 | 182 | 1023 | 154 | 181 | 1016 | 153 |
| 34 | 25 | 24 | 3.415 | 19.061 | 2.955 | 85 | 475 | 74 | 82 | 457 | 71 |
| 35 | 6 | 6 | 3.353 | 18.614 | 2.964 | 21 | 119 | 19 | 20 | 112 | 18 |
| 36 | 0 | 0 | 3.294 | 18.201 | 2.975 | 0 | 0 | 0 | 0 | 0 | 0 |
| 37 | 0 | 0 | 3.238 | 17.820 | 2.987 | 0 | 0 | 0 | 0 | 0 | 0 |
| 38 | 0 | 0 | 3.186 | 17.471 | 3.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 0 | 0 | 3.136 | 17.151 | 3.015 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 3.089 | 16.859 | 3.031 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 | 0 | 0 | 3.044 | 16.595 | 3.049 | 0 | 0 | 0 | 0 | 0 | 0 |
| 42 | 0 | 0 | 3.002 | 16.356 | 3.068 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 0 | 0 | 2.962 | 16.142 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 2.924 | 15.950 | 3.113 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 2.888 | 15.779 | 3.138 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 2.854 | 15.627 | 3.165 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 2.821 | 15.492 | 3.195 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 2.790 | 15.370 | 3.228 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 2.774 | 15.391 | 3.334 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 2.759 | 15.417 | 3.443 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 2.746 | 15.450 | 3.554 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 2.733 | 15.490 | 3.668 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 2.721 | 15.536 | 3.784 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 2.709 | 15.589 | 3.903 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 2.699 | 15.649 | 4.025 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 2.762 | 18.355 | 4.150 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 2.826 | 21.068 | 4.279 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 2.890 | 23.791 | 4.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 2.955 | 26.523 | 4.547 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 3.021 | 29.265 | 4.687 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 15,512 | 14,850 | | | | 60,943 | 356,919 | 45,371 | 58,314 | 341,462 | 43,436 |
| | | -662 | | | | | | | | | |

| TOTAL TONS (Base): | | TOTAL TONS (New): | |
|---|---|---|---|
| VOCs = | 0.067 | VOCs = | 0.064 |
| CO = | 0.393 | CO = | 0.376 |
| NOx = | 0.050 | NOx = | 0.046 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | -0.003 |
| CO = | -0.017 |
| NOx = | -0.002 |

NOTE...Multiply by 4 to get tons per dey.

CHICAGO 2010 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
PROTOTYPE TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 3 – 95th St. Station – CTA Dan Ryan Line Station Expansion

COLUMN #:

| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 6.736 | 46.190 | 2.406 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 4.939 | 37.032 | 2.253 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 3.969 | 31.385 | 2.148 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 3.363 | 27.519 | 2.069 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 2.949 | 24.688 | 2.005 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 2.704 | 22.515 | 1.951 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 2.510 | 20.789 | 1.905 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 2.347 | 19.381 | 1.865 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 2.207 | 18.208 | 1.829 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 2.084 | 17.217 | 1.797 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 1.975 | 16.366 | 1.769 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 1.877 | 15.628 | 1.743 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 1.787 | 14.982 | 1.720 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 1.705 | 14.412 | 1.699 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 1.629 | 13.906 | 1.680 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 1.558 | 13.453 | 1.663 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 9 | 8 | 1.491 | 13.046 | 1.647 | 13 | 114 | 14 | 12 | 104 | 13 |
| 20 | 5 | 5 | 1.427 | 12.497 | 1.636 | 8 | 68 | 9 | 7 | 62 | 8 |
| 21 | 6 | 6 | 1.377 | 11.820 | 1.630 | 8 | 67 | 9 | 8 | 71 | 10 |
| 22 | 0 | 0 | 1.331 | 11.204 | 1.626 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 | 5 | 5 | 1.288 | 10.641 | 1.622 | 6 | 53 | 8 | 6 | 53 | 8 |
| 24 | 24 | 24 | 1.248 | 10.126 | 1.618 | 31 | 248 | 40 | 30 | 243 | 39 |
| 25 | 762 | 716 | 1.212 | 9.652 | 1.615 | 923 | 7351 | 1230 | 868 | 6911 | 1156 |
| 26 | 1,450 | 1,353 | 1.178 | 9.214 | 1.613 | 1708 | 13363 | 2339 | 1594 | 12467 | 2182 |
| 27 | 1,462 | 1,385 | 1.146 | 8.810 | 1.611 | 1675 | 12880 | 2355 | 1587 | 12202 | 2231 |
| 28 | 1,922 | 1,821 | 1.116 | 8.436 | 1.610 | 2145 | 16213 | 3094 | 2032 | 15362 | 2932 |
| 29 | 2,075 | 1,995 | 1.088 | 8.087 | 1.610 | 2257 | 16777 | 3340 | 2171 | 16134 | 3212 |
| 30 | 933 | 900 | 1.062 | 7.763 | 1.610 | 991 | 7244 | 1502 | 956 | 6987 | 1449 |
| 31 | 1,672 | 1,601 | 1.037 | 7.461 | 1.611 | 1733 | 12472 | 2693 | 1660 | 11945 | 2579 |
| 32 | 959 | 919 | 1.014 | 7.179 | 1.612 | 972 | 6884 | 1546 | 932 | 6598 | 1481 |
| 33 | 1,391 | 1,346 | 0.992 | 6.915 | 1.614 | 1380 | 9620 | 2245 | 1335 | 9308 | 2172 |
| 34 | 1,175 | 1,141 | 0.971 | 6.667 | 1.616 | 1141 | 7835 | 1899 | 1108 | 7607 | 1844 |
| 35 | 667 | 648 | 0.951 | 6.434 | 1.620 | 635 | 4294 | 1081 | 616 | 4169 | 1050 |
| 36 | 11 | 11 | 0.932 | 6.218 | 1.623 | 10 | 68 | 18 | 10 | 68 | 18 |
| 37 | 0 | 0 | 0.914 | 6.011 | 1.628 | 0 | 0 | 0 | 0 | 0 | 0 |
| 38 | 0 | 0 | 0.897 | 5.817 | 1.633 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 0 | 0 | 0.881 | 5.635 | 1.639 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 0.866 | 5.464 | 1.645 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 | 0 | 0 | 0.851 | 5.302 | 1.652 | 0 | 0 | 0 | 0 | 0 | 0 |
| 42 | 0 | 0 | 0.837 | 5.149 | 1.660 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 0 | 0 | 0.823 | 5.004 | 1.669 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 0.810 | 4.868 | 1.678 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 0.798 | 4.739 | 1.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 0.786 | 4.618 | 1.700 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 0.774 | 4.503 | 1.712 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 0.763 | 4.395 | 1.725 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 0.760 | 4.399 | 1.770 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 0.756 | 4.404 | 1.816 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 0.753 | 4.411 | 1.863 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 0.750 | 4.420 | 1.911 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 0.748 | 4.431 | 1.961 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 0.745 | 4.443 | 2.012 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 0.743 | 4.458 | 2.064 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 0.752 | 4.801 | 2.118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 0.762 | 5.146 | 2.174 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 0.772 | 5.493 | 2.232 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 0.782 | 5.843 | 2.292 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 0.792 | 6.195 | 2.354 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 14,528 | 13,884 | | | | 15,637 | 115,551 | 23,424 | 14,933 | 110,290 | 22,385 |
| | | -644 | | | | | | | | | |

| TOTAL TONS (Base): | |
|---|---|
| VOCs = | 0.017 |
| CO = | 0.127 |
| NOx = | 0.026 |

| TOTAL TONS (New): | |
|---|---|
| VOCs = | 0.016 |
| CO = | 0.122 |
| NOx = | 0.025 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | -0.001 |
| CO = | -0.006 |
| NOx = | -0.001 |

NOTE...Multiply by 4 to get tons per day.

CHICAGO 1990 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
PROTOTYPE TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 4 – PACE – Martingale and Kimberly in Schaumburg
Transportation Center and Transfer Facility

| COLUMN #: 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 29.442 | 169.048 | 4.194 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 20.577 | 132.058 | 3.977 | 9 | 61 | 2 | 0 | 0 | 0 |
| 5 | 0 | 0 | 15.884 | 108.353 | 3.817 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 13.007 | 91.833 | 3.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 11.073 | 79.678 | 3.583 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 9.982 | 70.381 | 3.491 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 9.139 | 63.056 | 3.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 29 | 29 | 8.443 | 57.146 | 3.340 | 248 | 1675 | 98 | 245 | 1657 | 97 |
| 11 | 116 | 116 | 7.855 | 52.285 | 3.278 | 914 | 6086 | 382 | 911 | 6065 | 380 |
| 12 | 27 | 27 | 7.349 | 48.220 | 3.222 | 199 | 1303 | 87 | 198 | 1302 | 87 |
| 13 | 179 | 179 | 6.906 | 44.772 | 3.173 | 1238 | 8027 | 569 | 1236 | 8014 | 568 |
| 14 | 1,167 | 1,168 | 6.514 | 41.810 | 3.128 | 7603 | 48799 | 3651 | 7608 | 48834 | 3654 |
| 15 | 76 | 76 | 6.162 | 39.238 | 3.089 | 467 | 2973 | 234 | 468 | 2982 | 235 |
| 16 | 376 | 376 | 5.842 | 36.980 | 3.054 | 2197 | 13905 | 1148 | 2197 | 13904 | 1148 |
| 17 | 1,688 | 1,687 | 5.550 | 34.980 | 3.022 | 9369 | 59048 | 5101 | 9363 | 59011 | 5098 |
| 18 | 1,008 | 1,006 | 5.279 | 33.194 | 2.994 | 5323 | 33470 | 3019 | 5311 | 33393 | 3012 |
| 19 | 1,095 | 1,098 | 5.027 | 31.585 | 2.969 | 5503 | 34575 | 3250 | 5520 | 34680 | 3260 |
| 20 | 1,870 | 1,869 | 4.822 | 30.209 | 2.951 | 9018 | 56498 | 5519 | 9012 | 56461 | 5515 |
| 21 | 3,078 | 3,079 | 4.670 | 28.971 | 2.942 | 14376 | 89182 | 9056 | 14379 | 89202 | 9058 |
| 22 | 3,569 | 3,566 | 4.531 | 27.834 | 2.936 | 16172 | 99347 | 10479 | 16158 | 99256 | 10470 |
| 23 | 5,504 | 5,502 | 4.401 | 26.784 | 2.930 | 24223 | 147416 | 16126 | 24214 | 147366 | 16121 |
| 24 | 6,570 | 6,569 | 4.281 | 25.812 | 2.926 | 28128 | 169593 | 19225 | 28122 | 169559 | 19221 |
| 25 | 9,427 | 9,427 | 4.168 | 24.908 | 2.923 | 39293 | 234813 | 27556 | 39292 | 234808 | 27555 |
| 26 | 8,860 | 8,844 | 4.063 | 24.066 | 2.922 | 35998 | 213222 | 25889 | 35933 | 212840 | 25842 |
| 27 | 8,984 | 8,983 | 3.964 | 23.280 | 2.922 | 35614 | 209157 | 26252 | 35609 | 209124 | 26248 |
| 28 | 6,975 | 6,981 | 3.872 | 22.545 | 2.923 | 27006 | 157242 | 20387 | 27030 | 157387 | 20405 |
| 29 | 6,116 | 6,112 | 3.784 | 21.859 | 2.925 | 23141 | 133679 | 17888 | 23128 | 133602 | 17878 |
| 30 | 3,417 | 3,415 | 3.702 | 21.218 | 2.929 | 12648 | 72492 | 10007 | 12642 | 72459 | 10003 |
| 31 | 5,454 | 5,456 | 3.624 | 20.620 | 2.934 | 19765 | 112462 | 16002 | 19773 | 112503 | 16008 |
| 32 | 1,879 | 1,879 | 3.550 | 20.062 | 2.939 | 6671 | 37699 | 5523 | 6670 | 37696 | 5522 |
| 33 | 1,555 | 1,562 | 3.481 | 19.543 | 2.946 | 5413 | 30389 | 4581 | 5437 | 30526 | 4602 |
| 34 | 1,421 | 1,417 | 3.415 | 19.061 | 2.955 | 4852 | 27083 | 4199 | 4839 | 27009 | 4187 |
| 35 | 1,280 | 1,283 | 3.353 | 18.614 | 2.964 | 4292 | 23829 | 3794 | 4302 | 23882 | 3803 |
| 36 | 2,701 | 2,699 | 3.294 | 18.201 | 2.975 | 8896 | 49156 | 8035 | 8891 | 49124 | 8030 |
| 37 | 1,286 | 1,287 | 3.238 | 17.820 | 2.987 | 4163 | 22910 | 3840 | 4167 | 22934 | 3844 |
| 38 | 647 | 648 | 3.186 | 17.471 | 3.000 | 2062 | 11307 | 1942 | 2065 | 11321 | 1944 |
| 39 | 1,193 | 1,192 | 3.136 | 17.151 | 3.015 | 3741 | 20461 | 3597 | 3738 | 20444 | 3594 |
| 40 | 293 | 293 | 3.089 | 16.859 | 3.031 | 906 | 4944 | 889 | 905 | 4940 | 888 |
| 41 | 180 | 181 | 3.044 | 16.595 | 3.049 | 547 | 2985 | 548 | 551 | 3004 | 552 |
| 42 | 229 | 229 | 3.002 | 16.356 | 3.068 | 669 | 3752 | 704 | 687 | 3746 | 703 |
| 43 | 0 | 0 | 2.962 | 16.142 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 13 | 13 | 2.924 | 15.950 | 3.113 | 39 | 213 | 42 | 38 | 207 | 40 |
| 45 | 0 | 0 | 2.888 | 15.779 | 3.138 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 2.854 | 15.627 | 3.165 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 2.821 | 15.492 | 3.195 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 2.790 | 15.370 | 3.228 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 2.774 | 15.391 | 3.334 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 2.759 | 15.417 | 3.443 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 2.746 | 15.450 | 3.554 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 2.733 | 15.490 | 3.668 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 2.721 | 15.536 | 3.784 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 2.709 | 15.589 | 3.903 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 2.699 | 15.649 | 4.025 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 2.762 | 18.355 | 4.150 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 2.826 | 21.068 | 4.279 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 2.690 | 23.791 | 4.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 2.955 | 26.523 | 4.547 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 3.021 | 29.265 | 4.687 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 88,264 | 88,248 | | | | 360,722 | 2,139,754 | 259,620 | 360,639 | 2,139,244 | 259,572 |
| | | -16 | | | | | | | | | |

| TOTAL TONS (Base): | | TOTAL TONS (New): | |
|---|---|---|---|
| VOCs = | 0.398 | VOCs = | 0.398 |
| CO = | 2.359 | CO = | 2.358 |
| NOx = | 0.286 | NOx = | 0.286 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | -0.000 |
| CO = | -0.001 |
| NOx = | -0.000 |

NOTE...Multiply by 4 to get tons per day.

CHICAGO 2010 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
PROTOTYPE TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 4 – PACE – Martingale and Kimberly in Schaumburg
Transportation Center and Transfer Facility

COLUMN #:

| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 6.736 | 46.190 | 2.406 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 4.939 | 37.032 | 2.253 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 3.969 | 31.385 | 2.148 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 8 | 8 | 3.363 | 27.519 | 2.069 | 28 | 226 | 17 | 27 | 220 | 17 |
| 7 | 327 | 328 | 2.949 | 24.688 | 2.005 | 966 | 8083 | 656 | 967 | 8098 | 658 |
| 8 | 1,701 | 1,700 | 2.704 | 22.515 | 1.951 | 4599 | 38291 | 3318 | 4597 | 38276 | 3317 |
| 9 | 735 | 733 | 2.510 | 20.789 | 1.905 | 1846 | 15288 | 1401 | 1840 | 15238 | 1396 |
| 10 | 977 | 977 | 2.347 | 19.381 | 1.865 | 2294 | 18942 | 1823 | 2293 | 18935 | 1822 |
| 11 | 640 | 640 | 2.207 | 18.208 | 1.829 | 1412 | 11647 | 1170 | 1412 | 11653 | 1171 |
| 12 | 1,363 | 1,363 | 2.084 | 17.217 | 1.797 | 2840 | 23464 | 2449 | 2840 | 23467 | 2449 |
| 13 | 452 | 451 | 1.975 | 16.366 | 1.769 | 892 | 7393 | 799 | 891 | 7381 | 798 |
| 14 | 857 | 855 | 1.877 | 15.628 | 1.743 | 1608 | 13391 | 1494 | 1605 | 13362 | 1490 |
| 15 | 1,079 | 1,080 | 1.787 | 14.982 | 1.720 | 1928 | 16168 | 1856 | 1930 | 16181 | 1858 |
| 16 | 1,639 | 1,641 | 1.705 | 14.412 | 1.699 | 2794 | 23618 | 2784 | 2798 | 23650 | 2788 |
| 17 | 1,185 | 1,185 | 1.629 | 13.906 | 1.680 | 1930 | 16472 | 1990 | 1930 | 16479 | 1991 |
| 18 | 621 | 622 | 1.558 | 13.453 | 1.663 | 967 | 8349 | 1032 | 969 | 8368 | 1034 |
| 19 | 547 | 548 | 1.491 | 13.046 | 1.647 | 816 | 7136 | 901 | 817 | 7149 | 903 |
| 20 | 2,899 | 2,898 | 1.427 | 12.497 | 1.636 | 4136 | 36223 | 4742 | 4135 | 36216 | 4741 |
| 21 | 1,831 | 1,835 | 1.377 | 11.820 | 1.630 | 2521 | 21643 | 2985 | 2527 | 21690 | 2991 |
| 22 | 4,691 | 4,686 | 1.331 | 11.204 | 1.626 | 6244 | 52562 | 7628 | 6237 | 52502 | 7619 |
| 23 | 5,856 | 5,853 | 1.288 | 10.641 | 1.622 | 7542 | 62313 | 9498 | 7539 | 62282 | 9494 |
| 24 | 6,008 | 6,003 | 1.248 | 10.126 | 1.618 | 7498 | 60836 | 9721 | 7492 | 60786 | 9713 |
| 25 | 10,273 | 10,261 | 1.212 | 9.652 | 1.615 | 12450 | 99152 | 16590 | 12436 | 99039 | 16572 |
| 26 | 9,190 | 9,148 | 1.178 | 9.214 | 1.613 | 10826 | 84676 | 14823 | 10776 | 84290 | 14756 |
| 27 | 10,030 | 10,018 | 1.146 | 8.810 | 1.611 | 11495 | 88367 | 16159 | 11481 | 88259 | 16139 |
| 28 | 9,661 | 9,654 | 1.116 | 8.436 | 1.610 | 10781 | 81498 | 15554 | 10774 | 81441 | 15543 |
| 29 | 8,854 | 8,841 | 1.088 | 8.087 | 1.610 | 9633 | 71604 | 14255 | 9619 | 71497 | 14234 |
| 30 | 7,047 | 7,040 | 1.062 | 7.763 | 1.610 | 7484 | 54706 | 11346 | 7476 | 54652 | 11334 |
| 31 | 5,310 | 5,285 | 1.037 | 7.461 | 1.611 | 5506 | 39617 | 8554 | 5481 | 39431 | 8514 |
| 32 | 2,625 | 2,629 | 1.014 | 7.179 | 1.612 | 2662 | 18847 | 4232 | 2666 | 18874 | 4238 |
| 33 | 1,710 | 1,708 | 0.992 | 6.915 | 1.614 | 1697 | 11826 | 2760 | 1694 | 11811 | 2757 |
| 34 | 2,190 | 2,182 | 0.971 | 6.667 | 1.616 | 2126 | 14600 | 3539 | 2119 | 14547 | 3526 |
| 35 | 2,722 | 2,718 | 0.951 | 6.434 | 1.620 | 2589 | 17513 | 4410 | 2585 | 17488 | 4403 |
| 36 | 2,300 | 2,294 | 0.932 | 6.216 | 1.623 | 2144 | 14297 | 3733 | 2138 | 14260 | 3723 |
| 37 | 1,828 | 1,822 | 0.914 | 6.011 | 1.628 | 1671 | 10989 | 2976 | 1665 | 10952 | 2966 |
| 38 | 1,210 | 1,213 | 0.897 | 5.817 | 1.633 | 1086 | 7041 | 1977 | 1088 | 7056 | 1981 |
| 39 | 326 | 326 | 0.881 | 5.635 | 1.639 | 287 | 1836 | 534 | 287 | 1837 | 534 |
| 40 | 73 | 73 | 0.866 | 5.464 | 1.645 | 64 | 401 | 121 | 83 | 399 | 120 |
| 41 | 23 | 23 | 0.851 | 5.302 | 1.652 | 20 | 122 | 38 | 20 | 122 | 38 |
| 42 | 15 | 15 | 0.837 | 5.149 | 1.660 | 12 | 76 | 24 | 13 | 77 | 25 |
| 43 | 0 | 0 | 0.823 | 5.004 | 1.669 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 0.810 | 4.868 | 1.678 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 0.798 | 4.739 | 1.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 0.786 | 4.618 | 1.700 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 0.774 | 4.503 | 1.712 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 0.763 | 4.395 | 1.725 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 0.760 | 4.399 | 1.770 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 0.756 | 4.404 | 1.816 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 0.753 | 4.411 | 1.863 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 0.750 | 4.420 | 1.911 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 0.748 | 4.431 | 1.961 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 0.745 | 4.443 | 2.012 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 0.743 | 4.458 | 2.064 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 0.752 | 4.801 | 2.118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 0.782 | 5.146 | 2.174 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 0.772 | 5.493 | 2.232 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 0.782 | 5.843 | 2.292 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 0.792 | 6.195 | 2.354 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 108,803 | 108,656 | | | | | | | | | |
| | | -147 | | | | 135,393 | 1,059,216 | 177,890 | 135,227 | 1,057,963 | 177,652 |

| TOTAL TONS (Base): | |
|---|---|
| VOCs = | 0.149 |
| CO = | 1.168 |
| NOx = | 0.196 |

| TOTAL TONS (New): | |
|---|---|
| VOCs = | 0.149 |
| CO = | 1.166 |
| NOx = | 0.196 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | -0.000 |
| CO = | -0.001 |
| NOx = | -0.000 |

NOTE...Multiply by 4 to get tons per day.

CHICAGO 1990 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
PROTOTYPE TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 5 – Metra – Wood Dale – Milw West Line
New Distributor Bus Route

COLUMN #:

| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 29.442 | 169.048 | 4.194 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 20.577 | 132.058 | 3.977 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 15.884 | 108.353 | 3.817 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 13.007 | 91.833 | 3.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 11.073 | 79.678 | 3.583 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 9.982 | 70.381 | 3.491 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 9.139 | 63.056 | 3.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 8.443 | 57.146 | 3.340 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 7.855 | 52.285 | 3.278 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 7.349 | 48.220 | 3.222 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 6.906 | 44.772 | 3.173 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 6.514 | 41.810 | 3.128 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 6.162 | 39.238 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 5.842 | 36.980 | 3.054 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 21 | 21 | 5.550 | 34.980 | 3.022 | 115 | 725 | 63 | 117 | 735 | 63 |
| 18 | 452 | 452 | 5.279 | 33.194 | 2.994 | 2388 | 15017 | 1354 | 2386 | 15004 | 1353 |
| 19 | 806 | 808 | 5.027 | 31.585 | 2.969 | 4049 | 25443 | 2392 | 4062 | 25521 | 2399 |
| 20 | 1,770 | 1,772 | 4.822 | 30.209 | 2.951 | 8537 | 53480 | 5224 | 8545 | 53530 | 5229 |
| 21 | 1,404 | 1,401 | 4.670 | 28.971 | 2.942 | 6556 | 40672 | 4130 | 6543 | 40588 | 4122 |
| 22 | 1,483 | 1,482 | 4.531 | 27.834 | 2.936 | 6717 | 41266 | 4353 | 6715 | 41250 | 4351 |
| 23 | 2,192 | 2,197 | 4.401 | 26.784 | 2.930 | 9647 | 58710 | 6422 | 9669 | 58844 | 6437 |
| 24 | 2,585 | 2,589 | 4.281 | 25.812 | 2.926 | 11067 | 66728 | 7564 | 11084 | 66827 | 7575 |
| 25 | 738 | 737 | 4.168 | 24.908 | 2.923 | 3075 | 18379 | 2157 | 3072 | 18357 | 2154 |
| 26 | 795 | 795 | 4.063 | 24.066 | 2.922 | 3230 | 19133 | 2323 | 3230 | 19132 | 2323 |
| 27 | 509 | 511 | 3.964 | 23.280 | 2.922 | 2019 | 11859 | 1488 | 2026 | 11896 | 1493 |
| 28 | 145 | 146 | 3.872 | 22.545 | 2.923 | 563 | 3278 | 425 | 565 | 3292 | 427 |
| 29 | 240 | 241 | 3.784 | 21.859 | 2.925 | 908 | 5246 | 702 | 912 | 5268 | 705 |
| 30 | 115 | 114 | 3.702 | 21.218 | 2.929 | 427 | 2448 | 338 | 422 | 2419 | 334 |
| 31 | 0 | 0 | 3.624 | 20.620 | 2.934 | 0 | 0 | 0 | 0 | 0 | 0 |
| 32 | 162 | 162 | 3.550 | 20.062 | 2.939 | 575 | 3252 | 476 | 575 | 3250 | 476 |
| 33 | 132 | 135 | 3.481 | 19.543 | 2.946 | 460 | 2580 | 389 | 470 | 2638 | 398 |
| 34 | 213 | 212 | 3.415 | 19.061 | 2.955 | 726 | 4052 | 628 | 724 | 4041 | 626 |
| 35 | 145 | 145 | 3.353 | 18.614 | 2.964 | 485 | 2692 | 429 | 486 | 2699 | 430 |
| 36 | 42 | 42 | 3.294 | 18.201 | 2.975 | 138 | 765 | 125 | 138 | 764 | 125 |
| 37 | 130 | 129 | 3.238 | 17.820 | 2.987 | 421 | 2315 | 388 | 418 | 2299 | 385 |
| 38 | 0 | 0 | 3.186 | 17.471 | 3.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 0 | 0 | 3.136 | 17.151 | 3.015 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 3.089 | 16.858 | 3.031 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 | 0 | 0 | 3.044 | 16.595 | 3.049 | 0 | 0 | 0 | 0 | 0 | 0 |
| 42 | 0 | 0 | 3.002 | 16.356 | 3.068 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 0 | 0 | 2.962 | 16.142 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 2.924 | 15.950 | 3.113 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 2.888 | 15.779 | 3.138 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 2.854 | 15.627 | 3.165 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 2.821 | 15.492 | 3.195 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 2.790 | 15.370 | 3.228 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 2.774 | 15.391 | 3.334 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 2.759 | 15.417 | 3.443 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 2.746 | 15.450 | 3.554 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 2.733 | 15.490 | 3.668 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 2.721 | 15.536 | 3.784 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 2.709 | 15.589 | 3.903 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 2.699 | 15.649 | 4.025 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 2.762 | 18.355 | 4.150 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 2.826 | 21.068 | 4.279 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 2.890 | 23.791 | 4.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 2.955 | 26.523 | 4.547 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 3.021 | 29.265 | 4.687 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 14,079 | 14,091 | | | | 62,105 | 378,039 | 41,371 | 62,157 | 378,355 | 41,407 |
| | | 12 | | | | | | | | | |

| TOTAL TONS (Base): | | TOTAL TONS (New): | |
|---|---|---|---|
| VOCs = | 0.068 | VOCs = | 0.069 |
| CO = | 0.417 | CO = | 0.417 |
| NOx = | 0.046 | NOx = | 0.046 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | 0.000 |
| CO = | 0.000 |
| NOx = | 0.000 |

NOTE...Multiply by 4 to get tons per day.

CHICAGO 2010 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
PROTOTYPE TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 5 – Metra – Wood Dale – Milw West Line
New Distributor Bus Route

COLUMN #:

| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 6.736 | 46.190 | 2.406 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 4.939 | 37.032 | 2.253 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 3.969 | 31.385 | 2.148 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 3.363 | 27.519 | 2.069 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 2.949 | 24.688 | 2.005 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 2.704 | 22.515 | 1.951 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 2.510 | 20.789 | 1.905 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 2.347 | 19.381 | 1.865 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 2.207 | 18.208 | 1.829 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 2.084 | 17.217 | 1.797 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 1.975 | 16.366 | 1.769 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 40 | 40 | 1.877 | 15.628 | 1.743 | 74 | 618 | 69 | 75 | 625 | 70 |
| 15 | 0 | 0 | 1.787 | 14.982 | 1.720 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 1.705 | 14.412 | 1.699 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 1.629 | 13.906 | 1.680 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 1.558 | 13.453 | 1.663 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 520 | 521 | 1.491 | 13.046 | 1.647 | 775 | 6779 | 856 | 777 | 6797 | 858 |
| 20 | 21 | 21 | 1.427 | 12.497 | 1.636 | 30 | 266 | 35 | 30 | 262 | 34 |
| 21 | 424 | 424 | 1.377 | 11.820 | 1.630 | 584 | 5013 | 691 | 584 | 5012 | 691 |
| 22 | 225 | 224 | 1.331 | 11.204 | 1.626 | 299 | 2521 | 366 | 298 | 2510 | 364 |
| 23 | 1,248 | 1,249 | 1.288 | 10.641 | 1.622 | 1607 | 13276 | 2024 | 1609 | 13291 | 2026 |
| 24 | 372 | 375 | 1.248 | 10.126 | 1.618 | 465 | 3770 | 602 | 468 | 3797 | 607 |
| 25 | 916 | 917 | 1.212 | 9.652 | 1.615 | 1110 | 8840 | 1479 | 1111 | 8851 | 1481 |
| 26 | 1,603 | 1,607 | 1.178 | 9.214 | 1.613 | 1888 | 14769 | 2585 | 1893 | 14807 | 2592 |
| 27 | 1,349 | 1,356 | 1.146 | 8.810 | 1.611 | 1546 | 11883 | 2173 | 1554 | 11946 | 2185 |
| 28 | 2,919 | 2,928 | 1.116 | 8.436 | 1.610 | 3257 | 24623 | 4699 | 3268 | 24701 | 4714 |
| 29 | 1,976 | 1,977 | 1.088 | 8.087 | 1.610 | 2149 | 15976 | 3181 | 2151 | 15988 | 3183 |
| 30 | 2,031 | 2,044 | 1.062 | 7.763 | 1.610 | 2157 | 15764 | 3269 | 2171 | 15868 | 3291 |
| 31 | 1,891 | 1,902 | 1.037 | 7.461 | 1.611 | 1961 | 14109 | 3047 | 1972 | 14191 | 3064 |
| 32 | 1,563 | 1,563 | 1.014 | 7.179 | 1.612 | 1584 | 11217 | 2519 | 1585 | 11221 | 2520 |
| 33 | 887 | 890 | 0.992 | 6.915 | 1.614 | 880 | 6133 | 1431 | 883 | 6154 | 1436 |
| 34 | 1,291 | 1,293 | 0.971 | 6.667 | 1.616 | 1253 | 8605 | 2086 | 1256 | 8620 | 2089 |
| 35 | 1,976 | 1,980 | 0.951 | 6.434 | 1.620 | 1879 | 12711 | 3201 | 1883 | 12739 | 3208 |
| 36 | 975 | 974 | 0.932 | 6.216 | 1.623 | 909 | 6061 | 1583 | 908 | 6054 | 1581 |
| 37 | 1,520 | 1,522 | 0.914 | 6.011 | 1.628 | 1389 | 9137 | 2475 | 1391 | 9149 | 2478 |
| 38 | 1,373 | 1,375 | 0.897 | 5.817 | 1.633 | 1232 | 7987 | 2242 | 1233 | 7998 | 2245 |
| 39 | 2,031 | 2,031 | 0.881 | 5.635 | 1.639 | 1790 | 11447 | 3330 | 1789 | 11445 | 3329 |
| 40 | 1,962 | 1,963 | 0.866 | 5.464 | 1.645 | 1699 | 10721 | 3228 | 1700 | 10726 | 3229 |
| 41 | 1,020 | 1,026 | 0.851 | 5.302 | 1.652 | 868 | 5410 | 1686 | 873 | 5440 | 1695 |
| 42 | 388 | 387 | 0.837 | 5.149 | 1.660 | 324 | 1995 | 643 | 324 | 1993 | 642 |
| 43 | 107 | 107 | 0.823 | 5.004 | 1.669 | 88 | 538 | 179 | 88 | 535 | 179 |
| 44 | 160 | 160 | 0.810 | 4.868 | 1.678 | 129 | 778 | 268 | 130 | 779 | 268 |
| 45 | 38 | 38 | 0.798 | 4.739 | 1.689 | 30 | 181 | 64 | 30 | 180 | 64 |
| 46 | 478 | 476 | 0.786 | 4.818 | 1.700 | 374 | 2199 | 810 | 374 | 2198 | 809 |
| 47 | 43 | 43 | 0.774 | 4.503 | 1.712 | 33 | 194 | 74 | 33 | 194 | 74 |
| 48 | 140 | 140 | 0.763 | 4.395 | 1.725 | 107 | 615 | 242 | 107 | 615 | 242 |
| 49 | 216 | 217 | 0.760 | 4.399 | 1.770 | 164 | 950 | 382 | 165 | 955 | 384 |
| 50 | 188 | 188 | 0.756 | 4.404 | 1.816 | 142 | 826 | 341 | 142 | 828 | 341 |
| 51 | 110 | 111 | 0.753 | 4.411 | 1.863 | 83 | 484 | 204 | 84 | 490 | 207 |
| 52 | 0 | 0 | 0.750 | 4.420 | 1.911 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 128 | 128 | 0.748 | 4.431 | 1.961 | 96 | 568 | 252 | 96 | 567 | 251 |
| 54 | 44 | 44 | 0.745 | 4.443 | 2.012 | 33 | 197 | 89 | 33 | 195 | 89 |
| 55 | 0 | 0 | 0.743 | 4.458 | 2.064 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 0.752 | 4.801 | 2.118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 0.762 | 5.146 | 2.174 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 0.772 | 5.493 | 2.232 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 0.782 | 5.843 | 2.292 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 0.792 | 6.195 | 2.354 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 32,170 | 32,241 | | | | 32,991 | 237,166 | 52,404 | 33,067 | 237,721 | 52,520 |
| | | 71 | | | | | | | | | |

| TOTAL TONS (Base): | | TOTAL TONS (New): | |
|---|---|---|---|
| VOCs = | 0.036 | VOCs = | 0.036 |
| CO = | 0.261 | CO = | 0.262 |
| NOx = | 0.058 | NOx = | 0.058 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | 0.000 |
| CO = | 0.001 |
| NOx = | 0.000 |

NOTE...Multiply by 4 to get tons per dey.

CHICAGO 1990 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 8 – PACE – Routes #304, 322 CTA #25
Cermak/54th to IL43 – Signal Premptn

| COLUMN #: 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 29.442 | 169.048 | 4.194 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 20.577 | 132.058 | 3.977 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 15.884 | 108.353 | 3.817 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 13.007 | 91.833 | 3.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 11.073 | 79.678 | 3.583 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 9.982 | 70.381 | 3.491 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 20 | 19 | 9.139 | 63.056 | 3.411 | 180 | 1239 | 67 | 174 | 1198 | 65 |
| 10 | 6 | 6 | 8.443 | 57.146 | 3.340 | 54 | 362 | 21 | 51 | 343 | 20 |
| 11 | 7 | 7 | 7.855 | 52.285 | 3.278 | 51 | 340 | 21 | 55 | 366 | 23 |
| 12 | 43 | 43 | 7.349 | 48.220 | 3.222 | 317 | 2078 | 139 | 316 | 2073 | 139 |
| 13 | 19 | 20 | 6.906 | 44.772 | 3.173 | 134 | 867 | 61 | 138 | 895 | 63 |
| 14 | 4 | 4 | 6.514 | 41.810 | 3.128 | 29 | 184 | 14 | 26 | 167 | 13 |
| 15 | 39 | 40 | 6.162 | 39.238 | 3.089 | 242 | 1539 | 121 | 246 | 1570 | 124 |
| 16 | 39 | 39 | 5.842 | 36.980 | 3.054 | 230 | 1458 | 120 | 228 | 1442 | 119 |
| 17 | 37 | 37 | 5.550 | 34.980 | 3.022 | 205 | 1294 | 112 | 205 | 1294 | 112 |
| 18 | 105 | 106 | 5.279 | 33.194 | 2.994 | 555 | 3487 | 314 | 560 | 3519 | 317 |
| 19 | 195 | 194 | 5.027 | 31.585 | 2.969 | 979 | 6151 | 578 | 975 | 6127 | 576 |
| 20 | 822 | 822 | 4.822 | 30.209 | 2.951 | 3966 | 24846 | 2427 | 3964 | 24832 | 2426 |
| 21 | 1,514 | 1,514 | 4.670 | 28.971 | 2.942 | 7069 | 43853 | 4453 | 7070 | 43862 | 4454 |
| 22 | 2,732 | 2,728 | 4.531 | 27.834 | 2.936 | 12381 | 76056 | 8023 | 12361 | 75931 | 8009 |
| 23 | 4,975 | 4,964 | 4.401 | 26.784 | 2.930 | 21895 | 133253 | 14577 | 21847 | 132956 | 14545 |
| 24 | 8,428 | 8,428 | 4.281 | 25.812 | 2.926 | 36079 | 217534 | 24659 | 36080 | 217544 | 24660 |
| 25 | 9,139 | 9,141 | 4.168 | 24.908 | 2.923 | 38093 | 227643 | 26714 | 38100 | 227684 | 26719 |
| 26 | 5,217 | 5,218 | 4.063 | 24.066 | 2.922 | 21196 | 125547 | 15243 | 21201 | 125576 | 15247 |
| 27 | 3,555 | 3,555 | 3.964 | 23.280 | 2.922 | 14093 | 82767 | 10389 | 14092 | 82760 | 10388 |
| 28 | 1,210 | 1,209 | 3.872 | 22.545 | 2.923 | 4687 | 27289 | 3538 | 4681 | 27257 | 3534 |
| 29 | 1,238 | 1,233 | 3.784 | 21.859 | 2.925 | 4686 | 27068 | 3622 | 4666 | 26952 | 3607 |
| 30 | 3,263 | 3,253 | 3.702 | 21.218 | 2.929 | 12080 | 69235 | 9557 | 12043 | 69022 | 9528 |
| 31 | 3,070 | 3,062 | 3.624 | 20.620 | 2.934 | 11126 | 63303 | 9007 | 11097 | 63138 | 8984 |
| 32 | 3,718 | 3,703 | 3.550 | 20.062 | 2.939 | 13199 | 74589 | 10927 | 13146 | 74290 | 10883 |
| 33 | 2,114 | 2,111 | 3.481 | 19.543 | 2.946 | 7359 | 41315 | 6228 | 7348 | 41255 | 6219 |
| 34 | 1,032 | 1,028 | 3.415 | 19.061 | 2.955 | 3525 | 19675 | 3050 | 3511 | 19595 | 3038 |
| 35 | 200 | 198 | 3.353 | 18.614 | 2.964 | 672 | 3730 | 594 | 664 | 3686 | 587 |
| 36 | 158 | 157 | 3.294 | 18.201 | 2.975 | 520 | 2876 | 470 | 517 | 2858 | 467 |
| 37 | 0 | 0 | 3.238 | 17.820 | 2.987 | 0 | 0 | 0 | 0 | 0 | 0 |
| 38 | 48 | 48 | 3.186 | 17.471 | 3.000 | 152 | 833 | 143 | 153 | 839 | 144 |
| 39 | 0 | 0 | 3.136 | 17.151 | 3.015 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 3.089 | 16.859 | 3.031 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 | 0 | 0 | 3.044 | 16.595 | 3.049 | 0 | 0 | 0 | 0 | 0 | 0 |
| 42 | 0 | 0 | 3.002 | 16.356 | 3.068 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 0 | 0 | 2.962 | 16.142 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 2.924 | 15.950 | 3.113 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 2.888 | 15.779 | 3.138 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 2.854 | 15.627 | 3.165 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 2.821 | 15.492 | 3.195 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 2.790 | 15.370 | 3.228 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 2.774 | 15.391 | 3.334 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 2.759 | 15.417 | 3.443 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 2.746 | 15.450 | 3.554 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 2.733 | 15.490 | 3.668 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 2.721 | 15.536 | 3.784 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 2.709 | 15.589 | 3.903 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 2.699 | 15.649 | 4.025 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 2.762 | 18.355 | 4.150 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 2.826 | 21.068 | 4.279 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 2.890 | 23.791 | 4.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 2.955 | 26.523 | 4.547 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 3.021 | 29.265 | 4.687 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 52,950 | 52,887 | | | | | | | | | |
| | | −63 | | | | 215,751 | 1,280,413 | 155,192 | 215,513 | 1,279,031 | 155,008 |

| TOTAL TONS (Base): | |
|---|---|
| VOCs = | 0.238 |
| CO = | 1.411 |
| NOx = | 0.171 |

| TOTAL TONS (New): | |
|---|---|
| VOCs = | 0.238 |
| CO = | 1.410 |
| NOx = | 0.171 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | −0.000 |
| CO = | −0.002 |
| NOx = | −0.000 |

NOTE...Multiply by 4 to get tons per day.

CHICAGO 2010 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 6 - PACE - Routes #304, 322 CTA #25
Cermak/54th to IL43 - Signal Premptn

| COLUMN #: 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 6.736 | 46.190 | 2.406 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 3 | 3 | 4.939 | 37.032 | 2.253 | 14 | 104 | 6 | 15 | 111 | 7 |
| 5 | 10 | 9 | 3.969 | 31.385 | 2.148 | 38 | 301 | 21 | 36 | 282 | 19 |
| 6 | 0 | 0 | 3.363 | 27.519 | 2.069 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 14 | 13 | 2.949 | 24.688 | 2.005 | 41 | 344 | 28 | 38 | 321 | 26 |
| 8 | 43 | 42 | 2.704 | 22.515 | 1.951 | 116 | 965 | 84 | 114 | 946 | 82 |
| 9 | 22 | 22 | 2.510 | 20.789 | 1.905 | 56 | 461 | 42 | 55 | 457 | 42 |
| 10 | 117 | 117 | 2.347 | 19.381 | 1.865 | 275 | 2273 | 219 | 275 | 2268 | 218 |
| 11 | 20 | 20 | 2.207 | 18.208 | 1.829 | 45 | 368 | 37 | 44 | 364 | 37 |
| 12 | 7 | 7 | 2.084 | 17.217 | 1.797 | 14 | 118 | 12 | 15 | 121 | 13 |
| 13 | 29 | 29 | 1.975 | 16.366 | 1.769 | 57 | 473 | 51 | 57 | 475 | 51 |
| 14 | 124 | 123 | 1.877 | 15.628 | 1.743 | 233 | 1939 | 216 | 231 | 1922 | 214 |
| 15 | 13 | 13 | 1.787 | 14.982 | 1.720 | 22 | 188 | 22 | 23 | 195 | 22 |
| 16 | 90 | 91 | 1.705 | 14.412 | 1.699 | 154 | 1299 | 153 | 155 | 1311 | 155 |
| 17 | 19 | 19 | 1.629 | 13.906 | 1.680 | 31 | 268 | 32 | 31 | 264 | 32 |
| 18 | 532 | 532 | 1.558 | 13.453 | 1.663 | 829 | 7161 | 885 | 829 | 7157 | 885 |
| 19 | 62 | 62 | 1.491 | 13.046 | 1.647 | 93 | 814 | 103 | 92 | 809 | 102 |
| 20 | 667 | 669 | 1.427 | 12.497 | 1.636 | 952 | 8337 | 1091 | 955 | 8360 | 1094 |
| 21 | 487 | 486 | 1.377 | 11.820 | 1.630 | 670 | 5753 | 793 | 669 | 5745 | 792 |
| 22 | 1,621 | 1,623 | 1.331 | 11.204 | 1.626 | 2158 | 18167 | 2637 | 2160 | 18184 | 2639 |
| 23 | 3,544 | 3,541 | 1.288 | 10.641 | 1.622 | 4565 | 37716 | 5749 | 4561 | 37680 | 5744 |
| 24 | 6,617 | 6,610 | 1.248 | 10.126 | 1.818 | 8258 | 67004 | 10706 | 8249 | 66933 | 10695 |
| 25 | 8,297 | 8,295 | 1.212 | 9.652 | 1.615 | 10056 | 80078 | 13399 | 10054 | 80063 | 13396 |
| 26 | 6,308 | 6,299 | 1.178 | 9.214 | 1.613 | 7431 | 58122 | 10175 | 7420 | 58039 | 10160 |
| 27 | 7,269 | 7,273 | 1.146 | 8.810 | 1.611 | 8330 | 64039 | 11710 | 8335 | 64075 | 11717 |
| 28 | 4,919 | 4,910 | 1.116 | 8.436 | 1.610 | 5490 | 41500 | 7920 | 5480 | 41421 | 7905 |
| 29 | 4,692 | 4,684 | 1.088 | 8.087 | 1.610 | 5105 | 37945 | 7554 | 5096 | 37880 | 7541 |
| 30 | 4,145 | 4,129 | 1.062 | 7.763 | 1.610 | 4402 | 32177 | 6673 | 4385 | 32053 | 6648 |
| 31 | 1,958 | 1,954 | 1.037 | 7.461 | 1.611 | 2030 | 14605 | 3154 | 2026 | 14579 | 3148 |
| 32 | 2,004 | 1,999 | 1.014 | 7.179 | 1.612 | 2032 | 14383 | 3230 | 2027 | 14351 | 3222 |
| 33 | 2,101 | 2,098 | 0.992 | 6.915 | 1.614 | 2085 | 14531 | 3392 | 2081 | 14508 | 3386 |
| 34 | 1,254 | 1,251 | 0.971 | 6.667 | 1.616 | 1218 | 8362 | 2027 | 1215 | 8340 | 2022 |
| 35 | 393 | 392 | 0.951 | 6.434 | 1.620 | 374 | 2530 | 637 | 373 | 2522 | 635 |
| 36 | 290 | 289 | 0.932 | 6.216 | 1.623 | 270 | 1802 | 471 | 269 | 1796 | 469 |
| 37 | 37 | 37 | 0.914 | 6.011 | 1.628 | 34 | 225 | 61 | 34 | 222 | 60 |
| 38 | 104 | 104 | 0.897 | 5.817 | 1.633 | 93 | 606 | 170 | 93 | 605 | 170 |
| 39 | 0 | 0 | 0.881 | 5.635 | 1.639 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 0.866 | 5.464 | 1.645 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 | 11 | 11 | 0.851 | 5.302 | 1.652 | 9 | 58 | 18 | 9 | 58 | 18 |
| 42 | 0 | 0 | 0.837 | 5.149 | 1.660 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 7 | 7 | 0.823 | 5.004 | 1.669 | 6 | 35 | 12 | 6 | 35 | 12 |
| 44 | 0 | 0 | 0.810 | 4.868 | 1.678 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 0.798 | 4.739 | 1.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 0.786 | 4.618 | 1.700 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 0.774 | 4.503 | 1.712 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 0.763 | 4.395 | 1.725 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 0.760 | 4.399 | 1.770 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 0.756 | 4.404 | 1.816 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 0.753 | 4.411 | 1.863 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 0.750 | 4.420 | 1.911 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 0.748 | 4.431 | 1.961 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 0.745 | 4.443 | 2.012 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 0.743 | 4.458 | 2.064 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 0.752 | 4.801 | 2.118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 0.762 | 5.146 | 2.174 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 0.772 | 5.493 | 2.232 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 0.782 | 5.843 | 2.292 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 0.792 | 6.195 | 2.354 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 57,832 | 57,763 | | | | 67,587 | 525,055 | 93,490 | 67,507 | 524,453 | 93,379 |
| | | -69 | | | | | | | | | |

| TOTAL TONS (Base): | | TOTAL TONS (New): | |
|---|---|---|---|
| VOCs = | 0.075 | VOCs = | 0.074 |
| CO = | 0.579 | CO = | 0.578 |
| NOx = | 0.103 | NOx = | 0.103 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | -0.000 |
| CO = | -0.001 |
| NOx = | -0.000 |

NOTE...Multiply by 4 to get tone per day.

CHICAGO 1990 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 7 – PACE – I-294 Toll Plaza Bypass

COLUMN #:

| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 29.442 | 169.048 | 4.194 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 20.577 | 132.058 | 3.977 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 15.884 | 108.353 | 3.817 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 13.007 | 91.833 | 3.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 11.073 | 79.678 | 3.583 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 9.982 | 70.381 | 3.491 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 9.139 | 63.056 | 3.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 8.443 | 57.146 | 3.340 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 7.855 | 52.285 | 3.278 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 7.349 | 48.220 | 3.222 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 6.906 | 44.772 | 3.173 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 6.514 | 41.810 | 3.128 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 6.162 | 39.238 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 5.842 | 36.980 | 3.054 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 5.550 | 34.980 | 3.022 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 5.279 | 33.194 | 2.994 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 5.027 | 31.585 | 2.969 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 4.822 | 30.209 | 2.951 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 | 0 | 0 | 4.670 | 28.971 | 2.942 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 | 0 | 0 | 4.531 | 27.834 | 2.936 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 | 0 | 0 | 4.401 | 26.784 | 2.930 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 0 | 0 | 4.281 | 25.812 | 2.926 | 0 | 0 | 0 | 0 | 0 | 0 |
| 25 | 0 | 0 | 4.168 | 24.908 | 2.923 | 0 | 0 | 0 | 0 | 0 | 0 |
| 26 | 0 | 0 | 4.063 | 24.066 | 2.922 | 0 | 0 | 0 | 0 | 0 | 0 |
| 27 | 0 | 0 | 3.964 | 23.280 | 2.922 | 0 | 0 | 0 | 0 | 0 | 0 |
| 28 | 0 | 0 | 3.872 | 22.545 | 2.923 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29 | 0 | 0 | 3.784 | 21.859 | 2.925 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 3.702 | 21.218 | 2.929 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31 | 0 | 0 | 3.624 | 20.620 | 2.934 | 0 | 0 | 0 | 0 | 0 | 0 |
| 32 | 56 | 0 | 3.550 | 20.062 | 2.939 | 199 | 1125 | 165 | 0 | 0 | 0 |
| 33 | 19 | 0 | 3.481 | 19.543 | 2.946 | 66 | 371 | 56 | 0 | 0 | 0 |
| 34 | 35 | 0 | 3.415 | 19.061 | 2.955 | 120 | 667 | 103 | 0 | 0 | 0 |
| 35 | 17 | 0 | 3.353 | 18.614 | 2.964 | 59 | 325 | 52 | 0 | 0 | 0 |
| 36 | 0 | 0 | 3.294 | 18.201 | 2.975 | 0 | 0 | 0 | 0 | 0 | 0 |
| 37 | 0 | 0 | 3.238 | 17.820 | 2.987 | 0 | 0 | 0 | 0 | 0 | 0 |
| 38 | 0 | 0 | 3.166 | 17.471 | 3.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 0 | 0 | 3.136 | 17.151 | 3.015 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 3.089 | 16.859 | 3.031 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 | 0 | 0 | 3.044 | 16.595 | 3.049 | 0 | 0 | 0 | 0 | 0 | 0 |
| 42 | 0 | 0 | 3.002 | 16.356 | 3.068 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 0 | 0 | 2.962 | 16.142 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 2.924 | 15.950 | 3.113 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 2.888 | 15.779 | 3.138 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 2.854 | 15.627 | 3.165 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 2.821 | 15.492 | 3.195 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 2.790 | 15.370 | 3.228 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 2.774 | 15.391 | 3.334 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 2.759 | 15.417 | 3.443 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 2.746 | 15.450 | 3.554 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 2.733 | 15.490 | 3.668 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 2.721 | 15.536 | 3.784 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 2.709 | 15.589 | 3.903 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 2.699 | 15.649 | 4.025 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 2.762 | 18.355 | 4.150 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 2.826 | 21.068 | 4.279 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 2.890 | 23.791 | 4.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 2.955 | 26.523 | 4.547 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 3.021 | 29.265 | 4.687 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 128 | 0 | | | | 443 | 2,488 | 376 | 0 | 0 | 0 |
| | | -128 | | | | | | | | | |

| TOTAL TONS (Base): | | TOTAL TONS (New): | |
|---|---|---|---|
| VOCs = | 0.000 | VOCs = | 0.000 |
| CO = | 0.003 | CO = | 0.000 |
| NOx = | 0.000 | NOx = | 0.000 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | -0.000 |
| CO = | -0.003 |
| NOx = | -0.000 |

NOTE...Multiply by 4 to get tons per dey.

CHICAGO 1990 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 8 – CTA – King Dr. #3 – Automated Vehicle Control, w/ Signal Premptn

| COLUMN #: 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 29.442 | 169.048 | 4.194 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 20.577 | 132.058 | 3.977 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 15.884 | 108.353 | 3.817 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 13.007 | 91.833 | 3.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 11.073 | 79.678 | 3.583 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 9.982 | 70.381 | 3.491 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 20 | 19 | 9.139 | 63.056 | 3.411 | 180 | 1239 | 67 | 174 | 1198 | 65 |
| 10 | 6 | 6 | 8.443 | 57.146 | 3.340 | 54 | 362 | 21 | 51 | 343 | 20 |
| 11 | 7 | 7 | 7.855 | 52.285 | 3.278 | 51 | 340 | 21 | 55 | 366 | 23 |
| 12 | 94 | 94 | 7.349 | 48.220 | 3.222 | 689 | 4523 | 302 | 691 | 4533 | 303 |
| 13 | 219 | 219 | 6.906 | 44.772 | 3.173 | 1509 | 9783 | 693 | 1512 | 9805 | 695 |
| 14 | 40 | 40 | 6.514 | 41.810 | 3.128 | 264 | 1693 | 127 | 261 | 1672 | 125 |
| 15 | 122 | 124 | 6.162 | 39.238 | 3.089 | 754 | 4803 | 378 | 764 | 4866 | 383 |
| 16 | 57 | 57 | 5.842 | 36.980 | 3.054 | 335 | 2120 | 175 | 333 | 2108 | 174 |
| 17 | 57 | 58 | 5.550 | 34.980 | 3.022 | 318 | 2006 | 173 | 322 | 2029 | 175 |
| 18 | 27 | 27 | 5.279 | 33.194 | 2.994 | 144 | 908 | 82 | 143 | 896 | 81 |
| 19 | 82 | 81 | 5.027 | 31.585 | 2.969 | 410 | 2575 | 242 | 407 | 2558 | 240 |
| 20 | 863 | 863 | 4.822 | 30.209 | 2.951 | 4164 | 26085 | 2548 | 4161 | 26070 | 2547 |
| 21 | 334 | 334 | 4.670 | 28.971 | 2.942 | 1559 | 9673 | 982 | 1560 | 9676 | 983 |
| 22 | 2,059 | 2,059 | 4.531 | 27.834 | 2.936 | 9329 | 57310 | 6045 | 9329 | 57310 | 6045 |
| 23 | 2,608 | 2,607 | 4.401 | 26.784 | 2.930 | 12360 | 75222 | 8229 | 12354 | 75183 | 8225 |
| 24 | 5,445 | 5,444 | 4.281 | 25.812 | 2.926 | 23308 | 140536 | 15931 | 23306 | 140521 | 15929 |
| 25 | 3,236 | 3,237 | 4.168 | 24.908 | 2.923 | 13487 | 80598 | 9458 | 13492 | 80627 | 9462 |
| 26 | 1,447 | 1,448 | 4.063 | 24.066 | 2.922 | 5878 | 34816 | 4227 | 5883 | 34848 | 4231 |
| 27 | 741 | 740 | 3.964 | 23.280 | 2.922 | 2939 | 17258 | 2166 | 2933 | 17227 | 2162 |
| 28 | 577 | 577 | 3.872 | 22.545 | 2.923 | 2236 | 13020 | 1688 | 2234 | 13008 | 1687 |
| 29 | 700 | 701 | 3.784 | 21.859 | 2.925 | 2649 | 15303 | 2048 | 2653 | 15323 | 2050 |
| 30 | 117 | 119 | 3.702 | 21.218 | 2.929 | 435 | 2493 | 344 | 441 | 2525 | 349 |
| 31 | 32 | 32 | 3.624 | 20.620 | 2.934 | 116 | 663 | 94 | 116 | 660 | 94 |
| 32 | 15 | 16 | 3.550 | 20.062 | 2.939 | 55 | 311 | 46 | 57 | 321 | 47 |
| 33 | 0 | 0 | 3.481 | 19.543 | 2.946 | 0 | 0 | 0 | 0 | 0 | 0 |
| 34 | 8 | 8 | 3.415 | 19.061 | 2.955 | 28 | 157 | 24 | 27 | 152 | 24 |
| 35 | 0 | 0 | 3.353 | 18.614 | 2.964 | 0 | 0 | 0 | 0 | 0 | 0 |
| 36 | 0 | 0 | 3.294 | 18.201 | 2.975 | 0 | 0 | 0 | 0 | 0 | 0 |
| 37 | 0 | 0 | 3.238 | 17.820 | 2.987 | 0 | 0 | 0 | 0 | 0 | 0 |
| 38 | 0 | 0 | 3.186 | 17.471 | 3.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 0 | 0 | 3.136 | 17.151 | 3.015 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 3.089 | 16.859 | 3.031 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 | 0 | 0 | 3.044 | 16.595 | 3.049 | 0 | 0 | 0 | 0 | 0 | 0 |
| 42 | 0 | 0 | 3.002 | 16.356 | 3.068 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 0 | 0 | 2.962 | 16.142 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 2.924 | 15.950 | 3.113 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 2.888 | 15.779 | 3.138 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 2.854 | 15.627 | 3.165 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 2.821 | 15.492 | 3.195 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 2.790 | 15.370 | 3.228 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 2.774 | 15.391 | 3.334 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 2.759 | 15.417 | 3.443 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 2.746 | 15.450 | 3.554 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 2.733 | 15.490 | 3.668 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 2.721 | 15.536 | 3.784 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 2.709 | 15.589 | 3.903 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 2.699 | 15.649 | 4.025 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 2.762 | 18.355 | 4.150 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 2.826 | 21.068 | 4.279 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 2.890 | 23.791 | 4.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 2.955 | 26.523 | 4.547 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 3.021 | 29.265 | 4.687 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 19,116 | 19,117 | | | | 83,252 | 503,799 | 58,113 | 83,257 | 503,826 | 56,118 |
| | | 1 | | | | | | | | | |

| TOTAL TONS (Base): | | TOTAL TONS (New): | |
|---|---|---|---|
| VOCs = | 0.092 | VOCs = | 0.092 |
| CO = | 0.555 | CO = | 0.555 |
| NOx = | 0.062 | NOx = | 0.062 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | 0.000 |
| CO = | 0.000 |
| NOx = | 0.000 |

**NOTE...Multiply by 4 to get tons per day.**

CHICAGO 2010 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 8 – CTA – King Dr. #3 – Automated Vehicle Control, w/ Signal Premptn

| COLUMN #: 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 6.736 | 46.190 | 2.406 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 3 | 3 | 4.939 | 37.032 | 2.253 | 14 | 104 | 6 | 15 | 111 | 7 |
| 5 | 10 | 9 | 3.969 | 31.385 | 2.148 | 38 | 301 | 21 | 36 | 282 | 19 |
| 6 | 0 | 0 | 3.363 | 27.519 | 2.069 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 12 | 11 | 2.949 | 24.688 | 2.005 | 35 | 292 | 24 | 32 | 272 | 22 |
| 8 | 297 | 295 | 2.704 | 22.515 | 1.951 | 802 | 6676 | 578 | 798 | 6642 | 576 |
| 9 | 22 | 22 | 2.510 | 20.789 | 1.905 | 56 | 461 | 42 | 55 | 457 | 42 |
| 10 | 197 | 198 | 2.347 | 19.381 | 1.865 | 462 | 3819 | 367 | 465 | 3837 | 369 |
| 11 | 65 | 65 | 2.207 | 18.208 | 1.829 | 143 | 1177 | 118 | 143 | 1184 | 119 |
| 12 | 3 | 3 | 2.084 | 17.217 | 1.797 | 6 | 48 | 5 | 6 | 52 | 5 |
| 13 | 22 | 21 | 1.975 | 16.366 | 1.769 | 43 | 353 | 38 | 41 | 344 | 37 |
| 14 | 142 | 142 | 1.877 | 15.628 | 1.743 | 267 | 2227 | 248 | 267 | 2219 | 248 |
| 15 | 13 | 13 | 1.787 | 14.982 | 1.720 | 22 | 188 | 22 | 23 | 195 | 22 |
| 16 | 110 | 111 | 1.705 | 14.412 | 1.699 | 188 | 1586 | 187 | 189 | 1600 | 189 |
| 17 | 37 | 37 | 1.629 | 13.906 | 1.680 | 60 | 510 | 62 | 60 | 515 | 62 |
| 18 | 200 | 199 | 1.558 | 13.453 | 1.663 | 311 | 2687 | 332 | 310 | 2677 | 331 |
| 19 | 28 | 28 | 1.491 | 13.046 | 1.647 | 42 | 371 | 47 | 42 | 365 | 46 |
| 20 | 1,069 | 1,069 | 1.427 | 12.497 | 1.636 | 1525 | 13354 | 1748 | 1525 | 13359 | 1749 |
| 21 | 150 | 151 | 1.377 | 11.820 | 1.630 | 207 | 1778 | 245 | 208 | 1785 | 246 |
| 22 | 2,075 | 2,075 | 1.331 | 11.204 | 1.626 | 2762 | 23248 | 3374 | 2762 | 23248 | 3374 |
| 23 | 1,765 | 1,765 | 1.288 | 10.641 | 1.622 | 2273 | 18779 | 2863 | 2273 | 18781 | 2863 |
| 24 | 3,821 | 3,820 | 1.248 | 10.126 | 1.618 | 4768 | 38689 | 6182 | 4767 | 38681 | 6181 |
| 25 | 3,388 | 3,385 | 1.212 | 9.652 | 1.615 | 4106 | 32697 | 5471 | 4103 | 32672 | 5467 |
| 26 | 2,479 | 2,477 | 1.178 | 9.214 | 1.613 | 2920 | 22842 | 3999 | 2918 | 22823 | 3995 |
| 27 | 1,933 | 1,933 | 1.146 | 8.810 | 1.611 | 2215 | 17031 | 3114 | 2215 | 17030 | 3114 |
| 28 | 1,391 | 1,393 | 1.116 | 8.436 | 1.610 | 1552 | 11731 | 2239 | 1555 | 11751 | 2243 |
| 29 | 635 | 634 | 1.086 | 8.087 | 1.610 | 691 | 5137 | 1023 | 690 | 5127 | 1021 |
| 30 | 240 | 239 | 1.062 | 7.763 | 1.610 | 255 | 1862 | 386 | 254 | 1855 | 385 |
| 31 | 928 | 928 | 1.037 | 7.461 | 1.611 | 962 | 6920 | 1494 | 962 | 6924 | 1495 |
| 32 | 277 | 278 | 1.014 | 7.179 | 1.612 | 281 | 1991 | 447 | 282 | 1996 | 448 |
| 33 | 23 | 23 | 0.992 | 6.915 | 1.614 | 23 | 158 | 37 | 23 | 159 | 37 |
| 34 | 9 | 9 | 0.971 | 6.667 | 1.616 | 9 | 62 | 15 | 9 | 60 | 15 |
| 35 | 0 | 0 | 0.951 | 6.434 | 1.620 | 0 | 0 | 0 | 0 | 0 | 0 |
| 36 | 0 | 0 | 0.932 | 6.216 | 1.623 | 0 | 0 | 0 | 0 | 0 | 0 |
| 37 | 0 | 0 | 0.914 | 6.011 | 1.628 | 0 | 0 | 0 | 0 | 0 | 0 |
| 38 | 0 | 0 | 0.897 | 5.817 | 1.633 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 0 | 0 | 0.881 | 5.635 | 1.639 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 0.866 | 5.464 | 1.645 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 | 0 | 0 | 0.851 | 5.302 | 1.652 | 0 | 0 | 0 | 0 | 0 | 0 |
| 42 | 0 | 0 | 0.837 | 5.149 | 1.660 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 0 | 0 | 0.823 | 5.004 | 1.669 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 0.810 | 4.868 | 1.678 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 0.798 | 4.739 | 1.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 0.786 | 4.618 | 1.700 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 0.774 | 4.503 | 1.712 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 0.763 | 4.395 | 1.725 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 0.760 | 4.399 | 1.770 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 0.756 | 4.404 | 1.816 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 0.753 | 4.411 | 1.863 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 0.750 | 4.420 | 1.911 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 0.748 | 4.431 | 1.961 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 0.745 | 4.443 | 2.012 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 0.743 | 4.458 | 2.064 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 0.752 | 4.801 | 2.118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 0.762 | 5.146 | 2.174 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 0.772 | 5.493 | 2.232 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 0.782 | 5.643 | 2.292 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 0.792 | 6.195 | 2.354 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 21,341 | 21,336 | | | | 27,038 | 217,080 | 34,734 | 27,028 | 217,004 | 34,726 |
| | | -5 | | | | | | | | | |

| TOTAL TONS (Base): | | TOTAL TONS (New): | |
|---|---|---|---|
| VOCs = | 0.030 | VOCs = | 0.030 |
| CO = | 0.239 | CO = | 0.239 |
| NOx = | 0.038 | NOx = | 0.038 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | -0.000 |
| CO = | -0.000 |
| NOx = | -0.000 |

NOTE...Multiply by 4 to get tons per day.

CHICAGO 1990 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 9 – PACE – Subscription Bus Service to Sears

| COLUMN #: 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 29.442 | 169.048 | 4.194 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 20.577 | 132.058 | 3.977 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 15.884 | 108.353 | 3.817 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 13.007 | 91.833 | 3.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 11.073 | 79.678 | 3.583 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 9.982 | 70.381 | 3.491 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 9.139 | 63.056 | 3.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 8.443 | 57.146 | 3.340 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 7.855 | 52.285 | 3.278 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 7.349 | 48.220 | 3.222 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 6.906 | 44.772 | 3.173 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 6.514 | 41.810 | 3.128 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 6.162 | 39.238 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 5.842 | 36.980 | 3.054 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 5.550 | 34.980 | 3.022 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 5.279 | 33.194 | 2.994 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 5.027 | 31.585 | 2.969 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 4.822 | 30.209 | 2.951 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 | 0 | 0 | 4.670 | 28.971 | 2.942 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 | 0 | 0 | 4.531 | 27.834 | 2.936 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 | 0 | 0 | 4.401 | 26.784 | 2.930 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 0 | 0 | 4.281 | 25.812 | 2.926 | 0 | 0 | 0 | 0 | 0 | 0 |
| 25 | 0 | 0 | 4.168 | 24.908 | 2.923 | 0 | 0 | 0 | 0 | 0 | 0 |
| 26 | 0 | 0 | 4.063 | 24.066 | 2.922 | 0 | 0 | 0 | 0 | 0 | 0 |
| 27 | 0 | 0 | 3.964 | 23.280 | 2.922 | 0 | 0 | 0 | 0 | 0 | 0 |
| 28 | 0 | 0 | 3.872 | 22.545 | 2.923 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29 | 0 | 0 | 3.784 | 21.859 | 2.925 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 3.702 | 21.218 | 2.929 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31 | 135 | 0 | 3.624 | 20.620 | 2.934 | 489 | 2784 | 396 | 0 | 0 | 0 |
| 32 | 120 | 0 | 3.550 | 20.062 | 2.939 | 426 | 2407 | 353 | 0 | 0 | 0 |
| 33 | 1034 | 0 | 3.481 | 19.543 | 2.946 | 3599 | 20207 | 3046 | 0 | 0 | 0 |
| 34 | 69 | 0 | 3.415 | 19.061 | 2.955 | 236 | 1315 | 204 | 0 | 0 | 0 |
| 35 | 445 | 0 | 3.353 | 18.614 | 2.964 | 1492 | 8283 | 1319 | 0 | 0 | 0 |
| 36 | 522 | 0 | 3.294 | 18.201 | 2.975 | 1719 | 9501 | 1553 | 0 | 0 | 0 |
| 37 | 1555 | 0 | 3.238 | 17.820 | 2.987 | 5035 | 27710 | 4645 | 0 | 0 | 0 |
| 38 | 1740 | 0 | 3.186 | 17.471 | 3.000 | 5544 | 30400 | 5220 | 0 | 0 | 0 |
| 39 | 3738 | 0 | 3.136 | 17.151 | 3.015 | 11722 | 64110 | 11270 | 0 | 0 | 0 |
| 40 | 1766 | 0 | 3.089 | 16.859 | 3.031 | 5455 | 29773 | 5353 | 0 | 0 | 0 |
| 41 | 271 | 0 | 3.044 | 16.595 | 3.049 | 825 | 4497 | 826 | 0 | 0 | 0 |
| 42 | 115 | 0 | 3.002 | 16.356 | 3.068 | 345 | 1881 | 353 | 0 | 0 | 0 |
| 43 | 0 | 0 | 2.962 | 16.142 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 2.924 | 15.950 | 3.113 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 2.888 | 15.779 | 3.138 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 2.854 | 15.627 | 3.165 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 2.821 | 15.492 | 3.195 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 2.790 | 15.370 | 3.228 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 2.774 | 15.391 | 3.334 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 2.759 | 15.417 | 3.443 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 2.746 | 15.450 | 3.554 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 2.733 | 15.490 | 3.668 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 2.721 | 15.536 | 3.784 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 2.709 | 15.589 | 3.903 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 2.699 | 15.649 | 4.025 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 2.762 | 18.355 | 4.150 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 2.826 | 21.068 | 4.279 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 2.890 | 23.791 | 4.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 2.955 | 26.523 | 4.547 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 3.021 | 29.265 | 4.687 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 11510 | 0 | | | | | | | | | |
| | | −11510 | | | | 36,888 | 202,869 | 34,537 | 0 | 0 | 0 |

| TOTAL TONS (Base): | | TOTAL TONS (New): | |
|---|---|---|---|
| VOCs = | 0.041 | VOCs = | 0.000 |
| CO = | 0.224 | CO = | 0.000 |
| NOx = | 0.038 | NOx = | 0.000 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | −0.041 |
| CO = | −0.224 |
| NOx = | −0.038 |

NOTE...Multiply by 4 to get tons per day.

CHICAGO 1990 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 10 – PACE – Vanpool Service to Sears

| COLUMN #: 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 29.442 | 169.048 | 4.194 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 20.577 | 132.058 | 3.977 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 15.884 | 108.353 | 3.817 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 13.007 | 91.833 | 3.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 11.073 | 79.678 | 3.583 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 9.982 | 70.381 | 3.491 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 9.139 | 63.056 | 3.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 8.443 | 57.146 | 3.340 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 7.855 | 52.285 | 3.278 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 7.349 | 48.220 | 3.222 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 6.906 | 44.772 | 3.173 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 6.514 | 41.810 | 3.128 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 6.162 | 39.238 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 5.842 | 36.980 | 3.054 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 5.550 | 34.980 | 3.022 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 5.279 | 33.194 | 2.994 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 5.027 | 31.585 | 2.969 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 4.822 | 30.209 | 2.951 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 | 0 | 0 | 4.670 | 28.971 | 2.942 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 | 0 | 0 | 4.531 | 27.834 | 2.936 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 | 0 | 0 | 4.401 | 26.784 | 2.930 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 0 | 0 | 4.281 | 25.812 | 2.926 | 0 | 0 | 0 | 0 | 0 | 0 |
| 25 | 0 | 0 | 4.168 | 24.908 | 2.923 | 0 | 0 | 0 | 0 | 0 | 0 |
| 26 | 35 | 0 | 4.063 | 24.066 | 2.922 | 142 | 842 | 102 | 0 | 0 | 0 |
| 27 | 149 | 0 | 3.964 | 23.280 | 2.922 | 591 | 3469 | 435 | 0 | 0 | 0 |
| 28 | 0 | 0 | 3.872 | 22.545 | 2.923 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29 | 0 | 0 | 3.784 | 21.859 | 2.925 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30 | 50 | 0 | 3.702 | 21.218 | 2.929 | 185 | 1061 | 146 | 0 | 0 | 0 |
| 31 | 146 | 0 | 3.624 | 20.620 | 2.934 | 529 | 3011 | 428 | 0 | 0 | 0 |
| 32 | 627 | 0 | 3.550 | 20.062 | 2.939 | 2226 | 12579 | 1843 | 0 | 0 | 0 |
| 33 | 621 | 0 | 3.481 | 19.543 | 2.946 | 2162 | 12136 | 1829 | 0 | 0 | 0 |
| 34 | 249 | 0 | 3.415 | 19.061 | 2.955 | 850 | 4746 | 736 | 0 | 0 | 0 |
| 35 | 205 | 0 | 3.353 | 18.614 | 2.964 | 687 | 3816 | 608 | 0 | 0 | 0 |
| 36 | 472 | 0 | 3.294 | 18.201 | 2.975 | 1555 | 8591 | 1404 | 0 | 0 | 0 |
| 37 | 427 | 0 | 3.238 | 17.820 | 2.987 | 1383 | 7609 | 1275 | 0 | 0 | 0 |
| 38 | 653 | 0 | 3.186 | 17.471 | 3.000 | 2080 | 11409 | 1959 | 0 | 0 | 0 |
| 39 | 1084 | 0 | 3.136 | 17.151 | 3.015 | 3399 | 18592 | 3268 | 0 | 0 | 0 |
| 40 | 805 | 0 | 3.089 | 16.859 | 3.031 | 2487 | 13571 | 2440 | 0 | 0 | 0 |
| 41 | 524 | 0 | 3.044 | 16.595 | 3.049 | 1595 | 8696 | 1598 | 0 | 0 | 0 |
| 42 | 116 | 0 | 3.002 | 16.356 | 3.068 | 348 | 1897 | 356 | 0 | 0 | 0 |
| 43 | 82 | 0 | 2.962 | 16.142 | 3.089 | 243 | 1324 | 253 | 0 | 0 | 0 |
| 44 | 0 | 0 | 2.924 | 15.950 | 3.113 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 2.888 | 15.779 | 3.138 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 2.854 | 15.627 | 3.165 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 2.821 | 15.492 | 3.195 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 2.790 | 15.370 | 3.228 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 2.774 | 15.391 | 3.334 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 2.759 | 15.417 | 3.443 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 2.746 | 15.450 | 3.554 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 2.733 | 15.490 | 3.668 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 2.721 | 15.536 | 3.784 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 2.709 | 15.589 | 3.903 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 2.699 | 15.649 | 4.025 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 2.762 | 18.355 | 4.150 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 2.826 | 21.068 | 4.279 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 2.890 | 23.791 | 4.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 2.955 | 26.523 | 4.547 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 3.021 | 29.265 | 4.687 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 6245 | 0 | | | | | | | | | |
| | | -6245 | | | | 20,462 | 113,348 | 18,682 | 0 | 0 | 0 |

| TOTAL TONS (Base): | |
|---|---|
| VOCs = | 0.023 |
| CO = | 0.125 |
| NOx = | 0.021 |

| TOTAL TONS (New): | |
|---|---|
| VOCs = | 0.000 |
| CO = | 0.000 |
| NOx = | 0.000 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | -0.023 |
| CO = | -0.125 |
| NOx = | -0.021 |

NOTE...Multiply by 4 to get tons per day.

CHICAGO 1990 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 11 – RTA – Transit Check (Factored to existing use)

COLUMN #:

| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 28.442 | 189.048 | 4.194 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 20.577 | 132.058 | 3.977 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 15.884 | 108.353 | 3.817 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 13.007 | 91.833 | 3.689 | 0 | 3 | 0 | 0 | 3 | 0 |
| 7 | 0 | 0 | 11.073 | 79.678 | 3.583 | 0 | 1 | 0 | 0 | 1 | 0 |
| 8 | 0 | 0 | 9.962 | 70.381 | 3.481 | 0 | 1 | 0 | 0 | 1 | 0 |
| 9 | 0 | 0 | 9.139 | 63.058 | 3.411 | 1 | 5 | 0 | 1 | 5 | 0 |
| 10 | 0 | 0 | 8.443 | 57.148 | 3.340 | 3 | 21 | 1 | 3 | 20 | 1 |
| 11 | 0 | 0 | 7.855 | 52.285 | 3.279 | 4 | 24 | 2 | 4 | 24 | 1 |
| 12 | 2 | 2 | 7.348 | 48.220 | 3.222 | 15 | 98 | 7 | 15 | 96 | 6 |
| 13 | 4 | 4 | 6.908 | 44.772 | 3.173 | 27 | 178 | 12 | 27 | 172 | 12 |
| 14 | 5 | 5 | 6.514 | 41.810 | 3.128 | 30 | 195 | 15 | 30 | 193 | 14 |
| 15 | 8 | 8 | 6.162 | 39.238 | 3.089 | 47 | 302 | 24 | 46 | 295 | 23 |
| 16 | 13 | 13 | 5.842 | 36.980 | 3.054 | 78 | 495 | 41 | 78 | 482 | 40 |
| 17 | 22 | 21 | 5.550 | 34.980 | 3.022 | 119 | 753 | 65 | 117 | 739 | 64 |
| 18 | 38 | 37 | 5.279 | 33.194 | 2.994 | 204 | 1284 | 118 | 198 | 1245 | 112 |
| 19 | 67 | 65 | 5.027 | 31.585 | 2.969 | 335 | 2104 | 198 | 328 | 2048 | 193 |
| 20 | 117 | 115 | 4.822 | 30.209 | 2.951 | 586 | 3548 | 348 | 554 | 3470 | 338 |
| 21 | 212 | 207 | 4.670 | 28.971 | 2.942 | 990 | 6140 | 624 | 966 | 5990 | 609 |
| 22 | 404 | 391 | 4.531 | 27.834 | 2.936 | 1830 | 11243 | 1186 | 1773 | 10891 | 1148 |
| 23 | 845 | 824 | 4.401 | 26.764 | 2.930 | 2839 | 17278 | 1890 | 2745 | 16708 | 1828 |
| 24 | 790 | 783 | 4.281 | 25.812 | 2.928 | 3384 | 20403 | 2313 | 3288 | 19705 | 2234 |
| 25 | 780 | 755 | 4.166 | 24.908 | 2.923 | 3250 | 19422 | 2279 | 3145 | 18797 | 2206 |
| 26 | 780 | 781 | 4.063 | 24.068 | 2.922 | 3209 | 18900 | 2307 | 3091 | 18309 | 2223 |
| 27 | 728 | 703 | 3.964 | 23.280 | 2.922 | 2878 | 16809 | 2122 | 2786 | 16384 | 2054 |
| 28 | 640 | 620 | 3.872 | 22.545 | 2.923 | 2478 | 14428 | 1870 | 2402 | 13989 | 1814 |
| 29 | 578 | 563 | 3.784 | 21.956 | 2.925 | 2193 | 12887 | 1695 | 2130 | 12303 | 1648 |
| 30 | 580 | 565 | 3.702 | 21.218 | 2.929 | 2148 | 12309 | 1699 | 2092 | 11990 | 1655 |
| 31 | 504 | 483 | 3.624 | 20.620 | 2.934 | 1827 | 10394 | 1478 | 1767 | 10170 | 1447 |
| 32 | 454 | 444 | 3.550 | 20.082 | 2.939 | 1610 | 9099 | 1333 | 1577 | 9911 | 1305 |
| 33 | 431 | 424 | 3.481 | 19.543 | 2.948 | 1499 | 8417 | 1266 | 1475 | 8281 | 1249 |
| 34 | 405 | 400 | 3.415 | 19.061 | 2.955 | 1383 | 7717 | 1180 | 1367 | 7632 | 1183 |
| 35 | 354 | 350 | 3.353 | 18.614 | 2.964 | 1185 | 6581 | 1048 | 1175 | 6522 | 1039 |
| 36 | 321 | 319 | 3.294 | 18.201 | 2.975 | 1058 | 5838 | 954 | 1048 | 5797 | 948 |
| 37 | 264 | 262 | 3.238 | 17.820 | 2.987 | 854 | 4698 | 787 | 847 | 4664 | 782 |
| 38 | 233 | 232 | 3.186 | 17.471 | 3.000 | 744 | 4077 | 700 | 739 | 4052 | 696 |
| 39 | 190 | 190 | 3.136 | 17.151 | 3.015 | 597 | 3265 | 574 | 595 | 3253 | 572 |
| 40 | 148 | 148 | 3.089 | 16.859 | 3.031 | 480 | 2510 | 451 | 458 | 2501 | 450 |
| 41 | 118 | 118 | 3.044 | 16.595 | 3.049 | 360 | 1961 | 360 | 358 | 1954 | 359 |
| 42 | 88 | 88 | 3.002 | 16.356 | 3.068 | 265 | 1443 | 271 | 264 | 1441 | 270 |
| 43 | 70 | 70 | 2.962 | 16.142 | 3.089 | 209 | 1136 | 217 | 208 | 1135 | 217 |
| 44 | 62 | 62 | 2.924 | 15.950 | 3.113 | 182 | 995 | 194 | 182 | 993 | 194 |
| 45 | 58 | 57 | 2.888 | 15.779 | 3.138 | 166 | 910 | 181 | 166 | 907 | 180 |
| 46 | 45 | 45 | 2.854 | 15.627 | 3.165 | 127 | 696 | 141 | 127 | 696 | 141 |
| 47 | 29 | 29 | 2.821 | 15.462 | 3.195 | 81 | 445 | 92 | 81 | 444 | 92 |
| 48 | 23 | 23 | 2.790 | 15.370 | 3.228 | 63 | 349 | 73 | 63 | 349 | 73 |
| 48 | 12 | 12 | 2.774 | 15.391 | 3.334 | 33 | 182 | 39 | 33 | 182 | 39 |
| 50 | 8 | 9 | 2.759 | 15.417 | 3.443 | 24 | 132 | 30 | 24 | 132 | 30 |
| 51 | 6 | 8 | 2.748 | 15.450 | 3.554 | 17 | 96 | 22 | 17 | 96 | 22 |
| 52 | 3 | 3 | 2.733 | 15.490 | 3.668 | 8 | 43 | 10 | 8 | 43 | 10 |
| 53 | 5 | 5 | 2.721 | 15.538 | 3.784 | 13 | 75 | 18 | 13 | 75 | 18 |
| 54 | 2 | 2 | 2.709 | 15.588 | 3.903 | 5 | 28 | 7 | 5 | 28 | 7 |
| 55 | 2 | 2 | 2.699 | 15.648 | 4.025 | 5 | 31 | 8 | 5 | 31 | 8 |
| 56 | 1 | 1 | 2.782 | 16.355 | 4.150 | 4 | 23 | 5 | 4 | 23 | 5 |
| 57 | 3 | 3 | 2.828 | 21.068 | 4.279 | 8 | 57 | 12 | 8 | 57 | 12 |
| 58 | 1 | 1 | 2.880 | 23.791 | 4.411 | 2 | 15 | 3 | 2 | 15 | 3 |
| 59 | 0 | 0 | 2.955 | 26.523 | 4.547 | 1 | 8 | 1 | 1 | 8 | 1 |
| 60 | 0 | 0 | 3.021 | 29.265 | 4.687 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 10,263 | 10,019 | | | | 38,416 | 230,031 | 30,290 | 38,435 | 224,233 | 29,575 |
| | | -244 | | | | | | | | | |

| TOTAL TONS (Base): | |
|---|---|
| VOCs = | 0.043 |
| CO = | 0.254 |
| NOx = | 0.033 |

| TOTAL TONS (New): | |
|---|---|
| VOCs = | 0.042 |
| CO = | 0.247 |
| NOx = | 0.033 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | -0.001 |
| CO = | -0.006 |
| NOx = | -0.001 |

NOTE...Multiply by 4 to get tons per day.

CHICAGO 2010 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 11 – RTA – Transit Check (Factored to existing use)

COLUMN #:

| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 6.738 | 48.190 | 2.408 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 4.838 | 37.032 | 2.253 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 3.868 | 31.385 | 2.148 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 1 | 1 | 3.383 | 27.518 | 2.068 | 3 | 27 | 2 | 3 | 27 | 2 |
| 7 | 1 | 1 | 2.948 | 24.888 | 2.005 | 3 | 22 | 2 | 3 | 22 | 2 |
| 8 | 4 | 4 | 2.704 | 22.515 | 1.851 | 12 | 100 | 8 | 12 | 89 | 8 |
| 9 | 3 | 3 | 2.510 | 20.789 | 1.905 | 7 | 57 | 5 | 7 | 57 | 5 |
| 10 | 6 | 6 | 2.347 | 19.361 | 1.865 | 14 | 117 | 11 | 14 | 118 | 11 |
| 11 | 3 | 3 | 2.207 | 18.208 | 1.828 | 8 | 83 | 6 | 8 | 82 | 8 |
| 12 | 6 | 6 | 2.084 | 17.217 | 1.797 | 13 | 104 | 11 | 12 | 103 | 11 |
| 13 | 13 | 13 | 1.975 | 16.368 | 1.769 | 28 | 216 | 24 | 28 | 217 | 23 |
| 14 | 10 | 10 | 1.877 | 15.628 | 1.743 | 18 | 157 | 17 | 18 | 155 | 17 |
| 15 | 16 | 16 | 1.787 | 14.982 | 1.720 | 32 | 272 | 31 | 32 | 268 | 31 |
| 16 | 17 | 16 | 1.705 | 14.412 | 1.699 | 28 | 236 | 28 | 28 | 235 | 28 |
| 17 | 27 | 27 | 1.629 | 13.906 | 1.680 | 44 | 373 | 45 | 43 | 370 | 45 |
| 18 | 35 | 35 | 1.558 | 13.453 | 1.663 | 55 | 472 | 58 | 54 | 465 | 57 |
| 19 | 54 | 53 | 1.491 | 13.046 | 1.647 | 81 | 705 | 89 | 80 | 688 | 66 |
| 20 | 79 | 77 | 1.427 | 12.487 | 1.636 | 112 | 983 | 126 | 110 | 986 | 126 |
| 21 | 120 | 118 | 1.377 | 11.820 | 1.630 | 165 | 1419 | 198 | 162 | 1392 | 192 |
| 22 | 227 | 222 | 1.331 | 11.204 | 1.628 | 302 | 2543 | 388 | 295 | 2487 | 381 |
| 23 | 374 | 365 | 1.288 | 10.641 | 1.622 | 481 | 3977 | 606 | 470 | 3881 | 592 |
| 24 | 569 | 553 | 1.248 | 10.126 | 1.618 | 710 | 5758 | 920 | 691 | 5603 | 895 |
| 25 | 787 | 787 | 1.212 | 9.652 | 1.615 | 954 | 7594 | 1271 | 928 | 7400 | 1236 |
| 26 | 831 | 808 | 1.178 | 9.214 | 1.613 | 978 | 7655 | 1340 | 952 | 7448 | 1303 |
| 27 | 807 | 785 | 1.148 | 8.810 | 1.611 | 925 | 7108 | 1300 | 900 | 8818 | 1265 |
| 28 | 748 | 730 | 1.118 | 8.438 | 1.610 | 838 | 8322 | 1207 | 815 | 8158 | 1175 |
| 29 | 748 | 725 | 1.088 | 8.087 | 1.610 | 811 | 8030 | 1200 | 788 | 5864 | 1167 |
| 30 | 782 | 745 | 1.062 | 7.783 | 1.610 | 809 | 5812 | 1228 | 782 | 5787 | 1200 |
| 31 | 877 | 881 | 1.037 | 7.481 | 1.611 | 702 | 5052 | 1091 | 888 | 4834 | 1085 |
| 32 | 614 | 600 | 1.014 | 7.178 | 1.612 | 623 | 4411 | 990 | 608 | 4308 | 987 |
| 33 | 568 | 568 | 0.992 | 8.915 | 1.614 | 583 | 4138 | 885 | 581 | 4050 | 845 |
| 34 | 579 | 568 | 0.971 | 8.667 | 1.616 | 562 | 3858 | 935 | 552 | 3788 | 918 |
| 35 | 550 | 541 | 0.951 | 8.434 | 1.620 | 523 | 3539 | 881 | 515 | 3483 | 877 |
| 36 | 471 | 465 | 0.932 | 8.216 | 1.623 | 439 | 2928 | 764 | 433 | 2888 | 754 |
| 37 | 407 | 402 | 0.914 | 8.011 | 1.628 | 372 | 2448 | 883 | 367 | 2418 | 854 |
| 38 | 338 | 335 | 0.897 | 5.817 | 1.633 | 303 | 1988 | 552 | 300 | 1948 | 546 |
| 39 | 267 | 264 | 0.881 | 5.635 | 1.639 | 235 | 1503 | 437 | 232 | 1485 | 432 |
| 40 | 215 | 213 | 0.866 | 5.464 | 1.645 | 186 | 1174 | 353 | 184 | 1163 | 350 |
| 41 | 168 | 166 | 0.851 | 5.302 | 1.652 | 143 | 889 | 277 | 142 | 882 | 275 |
| 42 | 131 | 130 | 0.837 | 5.148 | 1.660 | 109 | 673 | 217 | 109 | 670 | 216 |
| 43 | 107 | 106 | 0.823 | 5.004 | 1.669 | 88 | 533 | 178 | 87 | 532 | 177 |
| 44 | 82 | 82 | 0.810 | 4.868 | 1.678 | 88 | 388 | 137 | 66 | 397 | 137 |
| 45 | 76 | 76 | 0.798 | 4.738 | 1.688 | 61 | 380 | 128 | 60 | 358 | 128 |
| 46 | 51 | 51 | 0.786 | 4.616 | 1.700 | 40 | 238 | 87 | 40 | 235 | 86 |
| 47 | 32 | 32 | 0.774 | 4.503 | 1.712 | 25 | 144 | 55 | 25 | 144 | 55 |
| 48 | 26 | 26 | 0.763 | 4.395 | 1.725 | 20 | 113 | 44 | 20 | 112 | 44 |
| 49 | 18 | 18 | 0.760 | 4.388 | 1.770 | 14 | 80 | 32 | 14 | 78 | 32 |
| 50 | 11 | 11 | 0.758 | 4.404 | 1.816 | 8 | 50 | 20 | 8 | 50 | 20 |
| 51 | 6 | 8 | 0.753 | 4.411 | 1.863 | 6 | 35 | 15 | 6 | 35 | 15 |
| 52 | 6 | 8 | 0.750 | 4.420 | 1.911 | 5 | 26 | 12 | 5 | 26 | 12 |
| 53 | 5 | 5 | 0.748 | 4.431 | 1.961 | 4 | 22 | 10 | 4 | 22 | 10 |
| 54 | 4 | 4 | 0.745 | 4.443 | 2.012 | 3 | 18 | 8 | 3 | 18 | 8 |
| 55 | 3 | 3 | 0.743 | 4.456 | 2.064 | 2 | 14 | 7 | 2 | 14 | 7 |
| 56 | 3 | 3 | 0.752 | 4.801 | 2.118 | 2 | 14 | 6 | 2 | 14 | 6 |
| 57 | 4 | 4 | 0.782 | 5.148 | 2.174 | 3 | 18 | 8 | 3 | 18 | 6 |
| 58 | 2 | 2 | 0.772 | 5.493 | 2.232 | 2 | 13 | 5 | 2 | 13 | 5 |
| 59 | 2 | 2 | 0.762 | 5.643 | 2.292 | 2 | 12 | 5 | 2 | 12 | 5 |
| 60 | 0 | 0 | 0.762 | 6.195 | 2.354 | 0 | 2 | 1 | 0 | 2 | 1 |
| | 11,703 | 11,462 | | | | 12,566 | 92,868 | 18,998 | 12,303 | 90,693 | 18,608 |
| | | -242 | | | | | | | | | |

| TOTAL TONS (Base): | | TOTAL TONS (New): | |
|---|---|---|---|
| VOCs = | 0.014 | VOCs = | 0.014 |
| CO = | 0.102 | CO = | 0.100 |
| NOx = | 0.021 | NOx = | 0.021 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | -0.000 |
| CO = | -0.002 |
| NOx = | -0.000 |

NOTE...Multiply by 4 to get tons per day.

CHICAGO 1990 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 12 – Metra – Franklin Pk–Milw West Line
Pedestrian/Auto Grade Separation

| COLUMN #: 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 29.442 | 169.048 | 4.194 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 20.577 | 132.058 | 3.977 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 15.884 | 108.353 | 3.817 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 13.007 | 91.833 | 3.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 11.073 | 79.678 | 3.583 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 9.982 | 70.381 | 3.491 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 9.139 | 63.056 | 3.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 8.443 | 57.146 | 3.340 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 7.855 | 52.285 | 3.278 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 7.349 | 48.220 | 3.222 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 6.906 | 44.772 | 3.173 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 6.514 | 41.810 | 3.128 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 6.162 | 39.238 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 5.842 | 36.980 | 3.054 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 16 | 16 | 5.550 | 34.980 | 3.022 | 86 | 545 | 47 | 89 | 560 | 48 |
| 18 | 135 | 135 | 5.279 | 33.194 | 2.994 | 714 | 4490 | 405 | 713 | 4481 | 404 |
| 19 | 283 | 282 | 5.027 | 31.585 | 2.969 | 1423 | 8939 | 840 | 1418 | 8907 | 837 |
| 20 | 170 | 170 | 4.822 | 30.209 | 2.951 | 818 | 5125 | 501 | 820 | 5136 | 502 |
| 21 | 123 | 123 | 4.670 | 28.971 | 2.942 | 576 | 3576 | 363 | 574 | 3563 | 362 |
| 22 | 287 | 287 | 4.531 | 27.834 | 2.936 | 1302 | 8000 | 844 | 1300 | 7988 | 843 |
| 23 | 313 | 308 | 4.401 | 26.784 | 2.930 | 1375 | 8371 | 916 | 1356 | 8249 | 902 |
| 24 | 227 | 226 | 4.281 | 25.812 | 2.926 | 972 | 5863 | 665 | 968 | 5834 | 661 |
| 25 | 290 | 289 | 4.168 | 24.908 | 2.923 | 1208 | 7221 | 847 | 1205 | 7198 | 845 |
| 26 | 159 | 159 | 4.063 | 24.066 | 2.922 | 645 | 3818 | 464 | 646 | 3826 | 465 |
| 27 | 18 | 18 | 3.964 | 23.280 | 2.922 | 71 | 418 | 52 | 71 | 419 | 53 |
| 28 | 17 | 14 | 3.872 | 22.545 | 2.923 | 66 | 382 | 50 | 54 | 316 | 41 |
| 29 | 49 | 42 | 3.784 | 21.859 | 2.925 | 185 | 1068 | 143 | 159 | 918 | 123 |
| 30 | 242 | 210 | 3.702 | 21.218 | 2.929 | 895 | 5127 | 708 | 777 | 4456 | 615 |
| 31 | 234 | 195 | 3.624 | 20.620 | 2.934 | 849 | 4828 | 687 | 707 | 4021 | 572 |
| 32 | 69 | 56 | 3.550 | 20.062 | 2.939 | 244 | 1380 | 202 | 199 | 1123 | 165 |
| 33 | 0 | 0 | 3.481 | 19.543 | 2.946 | 0 | 0 | 0 | 0 | 0 | 0 |
| 34 | 0 | 0 | 3.415 | 19.061 | 2.955 | 0 | 0 | 0 | 0 | 0 | 0 |
| 35 | 0 | 0 | 3.353 | 18.614 | 2.964 | 0 | 0 | 0 | 0 | 0 | 0 |
| 36 | 0 | 0 | 3.294 | 18.201 | 2.975 | 0 | 0 | 0 | 0 | 0 | 0 |
| 37 | 0 | 0 | 3.238 | 17.820 | 2.987 | 0 | 0 | 0 | 0 | 0 | 0 |
| 38 | 0 | 0 | 3.186 | 17.471 | 3.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 0 | 0 | 3.136 | 17.151 | 3.015 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 3.089 | 16.859 | 3.031 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 | 0 | 0 | 3.044 | 16.595 | 3.049 | 0 | 0 | 0 | 0 | 0 | 0 |
| 42 | 0 | 0 | 3.002 | 16.356 | 3.068 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 0 | 0 | 2.962 | 16.142 | 3.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 2.924 | 15.950 | 3.113 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 2.888 | 15.779 | 3.138 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 2.854 | 15.627 | 3.165 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 2.821 | 15.492 | 3.195 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 2.790 | 15.370 | 3.228 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 2.774 | 15.391 | 3.334 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 2.759 | 15.417 | 3.443 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 2.746 | 15.450 | 3.554 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 2.733 | 15.490 | 3.668 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 2.721 | 15.536 | 3.784 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 2.709 | 15.589 | 3.903 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 2.699 | 15.649 | 4.025 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 2.762 | 18.355 | 4.150 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 2.826 | 21.068 | 4.279 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 2.890 | 23.791 | 4.411 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 2.955 | 26.523 | 4.547 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 3.021 | 29.265 | 4.687 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2,631 | 2,530 | | | | 11,430 | 69,151 | 7,733 | 11,055 | 66,996 | 7,437 |
| | | −101 | | | | | | | | | |

| TOTAL TONS (Base): | | TOTAL TONS (New): | |
|---|---|---|---|
| VOCs = | 0.013 | VOCs = | 0.012 |
| CO = | 0.076 | CO = | 0.074 |
| NOx = | 0.009 | NOx = | 0.008 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | −0.000 |
| CO = | −0.002 |
| NOx = | −0.000 |

**NOTE...Multiply by 4 to get tons per day.**

CHICAGO 2010 TEST SCENARIO: MOBILE5 EMISSION FACTORS (12/4/92 Release) 10-Mar-93
TOTAL EMISSIONS SPREADSHEET
CAMBRIDGE SYSTEMATICS, INC.
ALTERNATIVE: Alternative 12 – Metra – Franklin Pk–Milw West Line
Pedestrian/Auto Grade Separation

COLUMN #:

| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMT: | | EMISSION FACTORS (g./mile): | | | BASE CASE TOTAL GRAMS: | | | NEW CASE TOTAL GRAMS: | | |
| SPEED | BASE | NEW | VOC | CO | NOx | VOC | CO | NOx | VOC | CO | NOx |
| 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 6.736 | 46.190 | 2.406 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 4.939 | 37.032 | 2.253 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 3.969 | 31.385 | 2.148 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 3.363 | 27.519 | 2.069 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 2.949 | 24.688 | 2.005 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 2.704 | 22.515 | 1.951 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 2.510 | 20.789 | 1.905 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 2.347 | 19.381 | 1.865 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 2.207 | 18.208 | 1.829 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 2.084 | 17.217 | 1.797 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 1.975 | 16.366 | 1.769 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 1.877 | 15.628 | 1.743 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 1.787 | 14.982 | 1.720 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 1.705 | 14.412 | 1.699 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 1.629 | 13.906 | 1.680 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 1.558 | 13.453 | 1.663 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 1.491 | 13.046 | 1.647 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | 21 | 21 | 1.427 | 12.497 | 1.636 | 30 | 266 | 35 | 30 | 262 | 34 |
| 21 | 90 | 91 | 1.377 | 11.820 | 1.630 | 124 | 1065 | 147 | 125 | 1076 | 148 |
| 22 | 112 | 111 | 1.331 | 11.204 | 1.626 | 149 | 1251 | 182 | 148 | 1244 | 180 |
| 23 | 193 | 192 | 1.288 | 10.641 | 1.622 | 248 | 2050 | 312 | 247 | 2043 | 311 |
| 24 | 126 | 124 | 1.248 | 10.126 | 1.618 | 157 | 1276 | 204 | 155 | 1256 | 201 |
| 25 | 135 | 133 | 1.212 | 9.652 | 1.615 | 163 | 1299 | 217 | 161 | 1284 | 215 |
| 26 | 204 | 205 | 1.178 | 9.214 | 1.613 | 241 | 1882 | 330 | 241 | 1889 | 331 |
| 27 | 194 | 194 | 1.146 | 8.810 | 1.611 | 222 | 1710 | 313 | 222 | 1709 | 313 |
| 28 | 291 | 292 | 1.116 | 8.436 | 1.610 | 325 | 2459 | 469 | 326 | 2463 | 470 |
| 29 | 152 | 131 | 1.088 | 8.087 | 1.610 | 166 | 1232 | 245 | 143 | 1059 | 211 |
| 30 | 247 | 201 | 1.062 | 7.763 | 1.610 | 262 | 1915 | 397 | 213 | 1560 | 324 |
| 31 | 192 | 169 | 1.037 | 7.461 | 1.611 | 199 | 1429 | 309 | 175 | 1261 | 272 |
| 32 | 155 | 138 | 1.014 | 7.179 | 1.612 | 157 | 1114 | 250 | 140 | 991 | 222 |
| 33 | 86 | 78 | 0.992 | 6.915 | 1.614 | 85 | 592 | 138 | 77 | 539 | 126 |
| 34 | 0 | 0 | 0.971 | 8.687 | 1.616 | 0 | 0 | 0 | 0 | 0 | 0 |
| 35 | 12 | 12 | 0.951 | 6.434 | 1.620 | 12 | 80 | 20 | 11 | 77 | 19 |
| 36 | 0 | 0 | 0.932 | 6.216 | 1.623 | 0 | 0 | 0 | 0 | 0 | 0 |
| 37 | 0 | 0 | 0.914 | 6.011 | 1.628 | 0 | 0 | 0 | 0 | 0 | 0 |
| 38 | 0 | 0 | 0.897 | 5.817 | 1.633 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 0 | 0 | 0.881 | 5.635 | 1.639 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 0.866 | 5.464 | 1.645 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 | 0 | 0 | 0.851 | 5.302 | 1.652 | 0 | 0 | 0 | 0 | 0 | 0 |
| 42 | 0 | 0 | 0.837 | 5.149 | 1.660 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 0 | 0 | 0.823 | 5.004 | 1.669 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 0.810 | 4.868 | 1.678 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 0.798 | 4.739 | 1.689 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 0.786 | 4.618 | 1.700 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 0.774 | 4.503 | 1.712 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 0.763 | 4.395 | 1.725 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 0 | 0 | 0.760 | 4.399 | 1.770 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 0.756 | 4.404 | 1.816 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | 0 | 0 | 0.753 | 4.411 | 1.863 | 0 | 0 | 0 | 0 | 0 | 0 |
| 52 | 0 | 0 | 0.750 | 4.420 | 1.911 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | 0 | 0 | 0.748 | 4.431 | 1.981 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 0.745 | 4.443 | 2.012 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 0 | 0 | 0.743 | 4.459 | 2.064 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56 | 0 | 0 | 0.752 | 4.801 | 2.118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 0.762 | 5.146 | 2.174 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 0.772 | 5.493 | 2.232 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 0.782 | 5.843 | 2.292 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 0.792 | 6.195 | 2.354 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2,210 | 2,092 | | | | 2,540 | 19,618 | 3,568 | 2,416 | 18,713 | 3,378 |
| | | -118 | | | | | | | | | |

| TOTAL TONS (Base): | |
|---|---|
| VOCs = | 0.003 |
| CO = | 0.022 |
| NOx = | 0.004 |

| TOTAL TONS (New): | |
|---|---|
| VOCs = | 0.003 |
| CO = | 0.021 |
| NOx = | 0.004 |

| CHANGE FROM BASE TO NEW: | |
|---|---|
| VOCs = | -0.000 |
| CO = | -0.001 |
| NOx = | -0.000 |

NOTE...Multiply by 4 to get tons per day.